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The Chemical Age

VOL LXII 22 APRIL 1950 No 1606

R.T.E. RING-BALANCE METER

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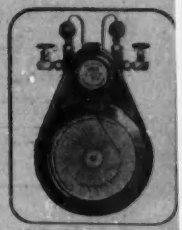
The meter can be used for recording, recording and integrating, or recording, indicating and integrating. It is available with air-operated automatic control, using the Kent Mark 20 Controller, and is also available with electrical remote transmission or air transmission.



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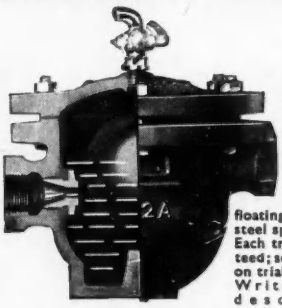

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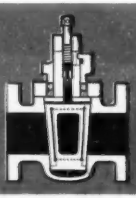

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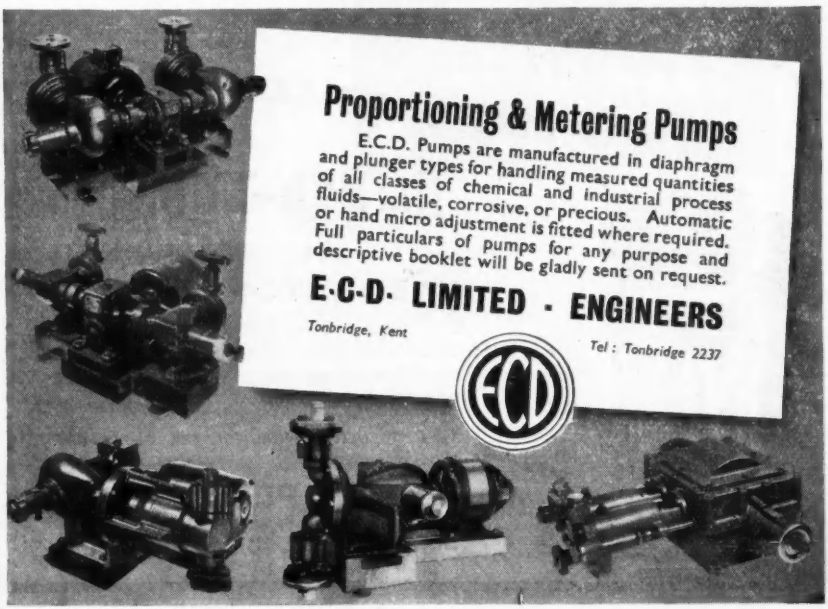
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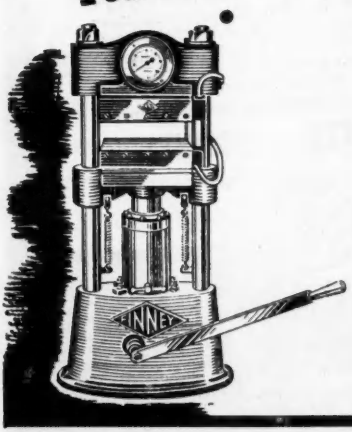

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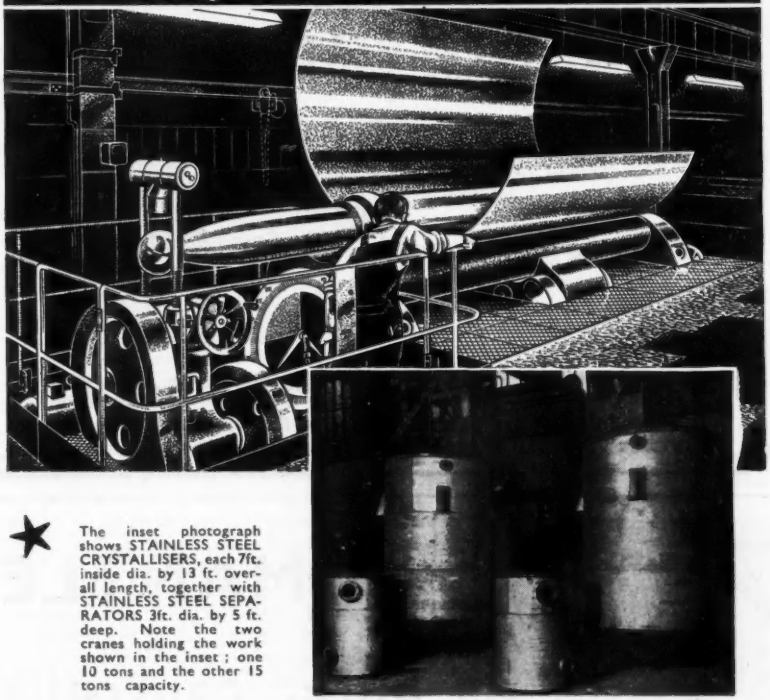

★ The inset photograph shows STAINLESS STEEL CRYSTALLISERS, each 7ft. inside dia. by 13 ft. over-all length, together with STAINLESS STEEL SEPARATORS 3ft. dia. by 5 ft. deep. Note the two cranes holding the work shown in the inset; one 10 tons and the other 15 tons capacity.

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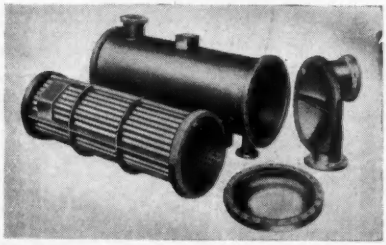

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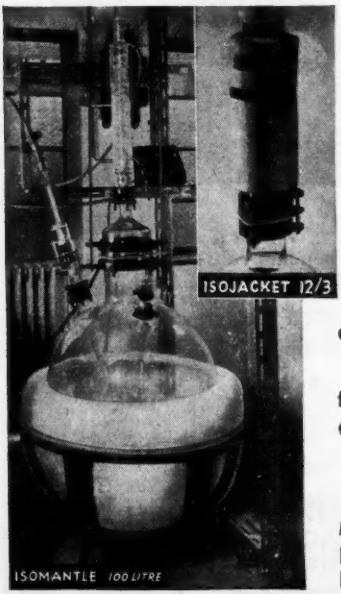

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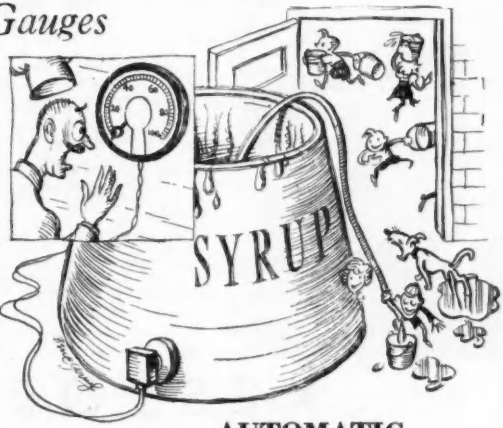

At their Plaistow Refinery, Messrs. Tate & Lyle Ltd. use the Evershed Tank Contents Gauge for indicating remotely the quantity of syrup in tanks.

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The gauge consists of a transmitter fitted near to the base of the tank and connected by two wires to one or more indicators or chart recorders installed at any convenient control centre in the factory. A controller can also be included for the automatic regulation of pneumatically operated valves.

The transmitter contains a diaphragm which is exposed to the pressure of the liquid in the tank. Through a system of compound levers the deflection of this diaphragm is opposed by the attraction of a coil by an electro-magnet, the current through the coil being automatically varied so as to balance the pressure on the diaphragm. The current through the coil, which is therefore a measure of the tank contents, passes through the remote indicators and recorders which are connected electrically in series.

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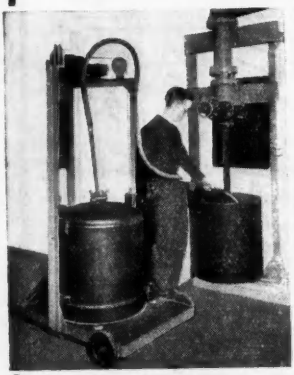

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Methyl Ethyl Ketone	72·1	79·6°C	8·07
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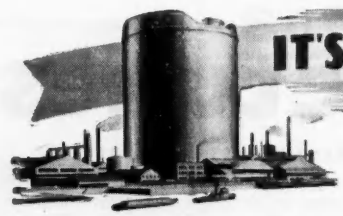

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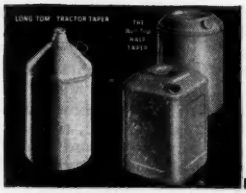

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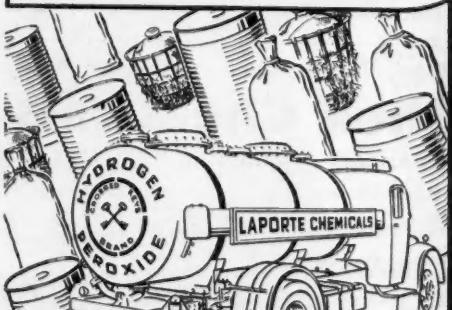

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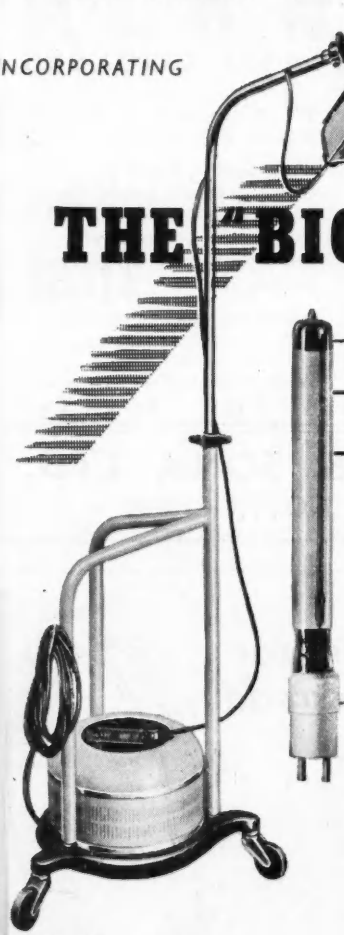
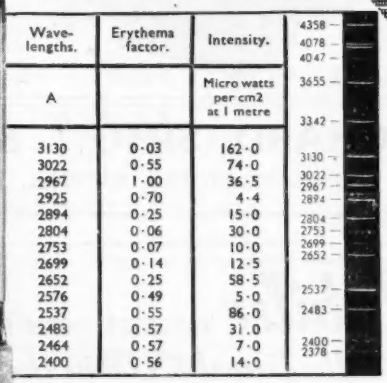
THE "BIOSOL" BURNER



SPECTRAL intensity graph and table showing energy distribution over effective wavelengths with typical 'Biosol' apparatus.

Wave-lengths.	Erythema factor.	Intensity.
A		Micro watts per cm2 at 1 metre
3130	0·03	162·0
3022	0·55	74·0
2967	1·00	36·5
2925	0·70	4·4
2894	0·25	15·0
2804	0·06	30·0
2753	0·07	10·0
2699	0·14	12·5
2652	0·25	58·5
2576	0·49	5·0
2537	0·55	86·0
2483	0·57	31·0
2464	0·57	7·0
2400	0·56	14·0



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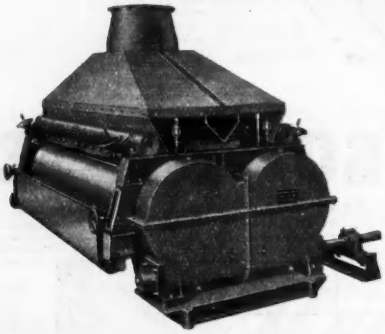

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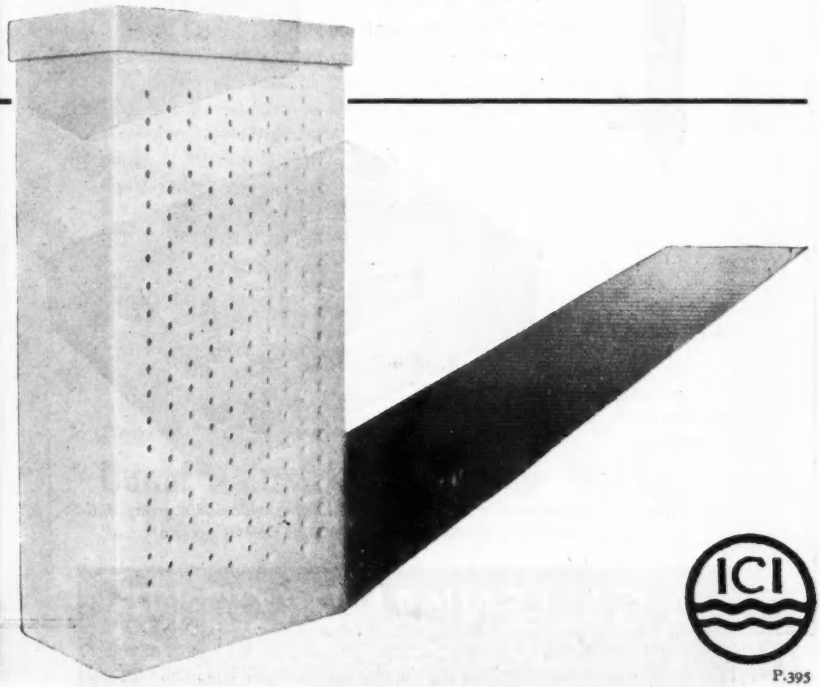

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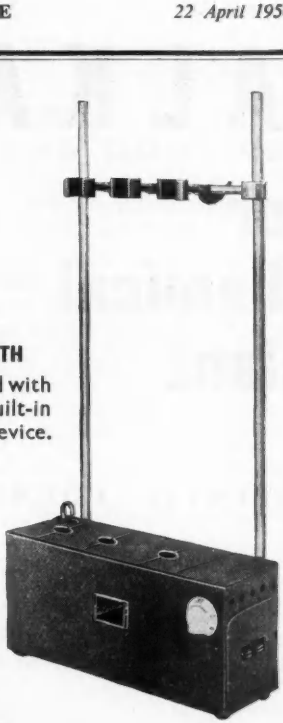

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Securing the Future

UNITED Kingdom chemical industry is generally acknowledged to be the second largest in the world and more than 3000 chemists are continually employed in its research departments alone. In the light of such facts the apparent neglect of some of the essential supports of an edifice of those proportions, of which convincing accounts have been given in the past few days, might suggest an almost criminal degree of casualness in a more logical system of industrial priorities. Chemical industries can manifestly not be maintained at their present scale—and all the portents show they must do much more than that—if they cannot find in the next decade or two a substantially larger body of human "replacement," qualified chemists with the great variety of skills contemporary industry requires. The same conclusion must be admitted if some drastic improvements are not quickly made in the facilities by which chemical engineers and new types of chemical plant are produced.

The justification of the anxiety on the part of the Royal Institute of Chemistry lest a deficiency of chemists should stultify chemical advancement, perhaps ten years hence, was the frank admission in Birmingham last week by Professor M. Stacey, of Birmingham University, that there is neither room nor places to train all those who hope to become research chemists. The dismal effect of that can well be realised in view of the fact that the professor was describing to sixth-formers of Birmingham and district schools what were their prospects of careers in chemistry. He disclosed, for example, that there were 928 applicants last year for the 53 places available in the chemistry honours school at Birmingham and this year some 700 competed for the 50 vacancies. The number who will pass through that needle's eye—which is certainly not peculiar to the University of Birmingham—will need to be exceptional people, but their ranks will be attenuated. The fault is clearly not the university's, as Professor Stacey was at pains to point out. "We are apparently low down on the list of priorities for new buildings," he said. "We have no influence in getting laboratories built. At present we are accommodating 600 students in laboratories designed to hold 250, and we have been in that position since 1944."

A further example of the apparent

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absence of the note of urgency in matters which intimately concern the future of industrial chemistry here has been brought to light by the chemical engineers, whose research facilities, save in the private departments of the large industrial groups, are relatively scarcer and more primitive than those of any other branch of chemical industry. The indictment is given a new emphasis by the admission made in London last week by the president of the Institution of Chemical Engineers, Professor D. M. Newitt, that all the processes about which they made such a to-do in scientific papers originated, as it were, "in the kitchen." Here, fortunately, the nightmare of having to induce a high pressure reaction *in vacuo* is rendered less oppressive by the knowledge that the Institution has succeeded in convincing the Government representatives that the fundamental problems of chemical engineering deserve study on the scale which has long been given to many other industrial themes no more deserving. That and the provision of larger training facilities for chemical engineers should in the long run infuse new vigour into the drive to produce more chemicals, and new ones, which at the moment is overshadowed by the inspired opportunism and energy of chemical industries in the U.S.A.

The habit of leaving to the enterprise of some other country, generally America, the prestige and profit of what was begun here is now, it seems, no longer to be regarded tolerantly as an old British custom. The president of the Chemical Engineers has left little doubt that this form of altruism is one more of those extravagances which we can no longer afford. It has in the past, he recalls, dissipated our resources in a multiplicity of ways. Buying the "know how" of processes built to implement what were originally British inventions still commonly costs dollars, but the loss is not to be expressed wholly in terms of currency. There is no more disastrous policy—says Professor Newitt—than for an industry to fail to develop its own processes. Dependence on work done abroad saps initiative here and withholds opportunity for experience and training. Most people will agree that even the loss of dollars is by far the least of those evils.

Notes and Comments

No Help from the Budget

TO say that the predominant feature of the Budget proposals was a conspicuous omission—the failure to afford help of any kind to the industries upon which the hope of "safeguarding the future of the people" fundamentally depends—does not misrepresent Sir Stafford Cripps's half-hearted performance on Wednesday. The reasons advanced for the increase by 9d. per gallon of the cost of hydrocarbon oils, and of commercial vehicles by 33⅓ per cent, cannot obscure the discouraging certainty that these further burdens on industry, designed perhaps to enforce submission to the costly railway freight tariffs, must inflate production costs and render all classes of export goods that much less competitive. The large taxation component in the cost of light oils has been repeatedly attacked in the past as an unwarranted burden on industries, among which chemical processes have suffered more than some others. None of those substantial arguments would appear to have had any weight in the 1950 Budget, whose evasion of responsibility to promote any improvement in conditions for industry justifies a demand that something much more realistic shall be put in its place as soon as possible.

Chemists' Month in New York

THAT increasingly familiar phenomenon sometimes known as "dollar aid" can seldom have been better employed than in the cause for which American chemical industries are now being asked to subscribe a quarter of a million dollars. This sum is needed to facilitate in New York in September next year one of the largest gatherings of chemists since the 1947 congress in Great Britain. In 1951, New York will welcome the 12th International Congress of Pure and Applied Chemistry, celebrating at the same time the 75th anniversary of the American Chemical Society. The society, which started with 230 members in 1876, is now one of the largest professional associations of scientific workers in the world, with a membership of more than 63,000. The congress, held every four years, will continue from September 10-13. It is being sponsored by the Division of Chemistry and Chemical Technology of the United States National Research Council. Much of the fund raised will be used to aid foreign visitors, especially those from countries where there is a dollar shortage. The International Union of Pure and Applied Chemistry, which normally meets every two years for setting up uniform chemical standards, will also meet in 1951. The 16th conference is due to take place in New York on September 8 and 9, and will also meet in Washington on September 14 and 15—the 50th anniversary of the National Bureau of Standards.

Chemical Expansion in Brazil

IN marked contrast with what is generally the result of State participation in industries are some of the current results of the Government-and-industry enterprises in Brazil, described in a message from a CHEMICAL AGE correspondent in Teresópolis (Rio). The explanation of the unusual degree of success is probably to be found in the facts that in many of the new chemical undertakings, most of them brought into being in response to the wartime shortage of normal supplies, the Government agencies have provided finance rather than the direction, and the highly developed technology of North American industries has been used on a generous scale. However favourable these factors, the comparatively recent expansion of Brazilian chemical industries to rank fourth in value among all industrial activities is a phenomenon which no one could have predicted ten years ago. Brazil has in fact attained self sufficiency in a number of basic chemical materials notwith-

standing some formidable impediments, the scarcity of high-grade supplies of several essentials, such as fuel and trained work people. Nearly all the acetic, hydrochloric and tartaric acids are now made within the country. Sulphuric acid is coming from Brazilian plants on a continually increasing scale, although still largely dependent on foreign sources of sulphur, and home supplies of glycerin and cellulose are sustaining a growing explosives industry. The list of relatively new products could be extended almost indefinitely by the inclusion of the diversity of by-products of the Volta Redonda steel mill and coke ovens. The sum of all these factors, however, does not represent a "water-tight" chemical economy. They are in most cases the starting points of new industries which will call for the many specialised products in plant and materials which Brazil is certainly not yet ready to make for herself.

Optical Glass

THE genesis of optical glass making under scientifically controlled conditions and some of the modern instruments' remote predecessors formed the subject of a far-ranging study by a technologist of the National Bureau of Standards in the U.S.A. That was a review by Francis W. Glaze, whose contribution to the Smithsonian Report has been reproduced as a separate publication, the appeal of which will not be confined to America. "The Optical Glass Industry, Past and Present," serves incidentally to recall how spasmodic has been the growth of optical glass making. Quartz and glass lenses have been found in the ruins of Nineveh, Pompeii and Herculaneum; Ptolemy, in the first century of the present era, wrote a book on optics; yet some 1500 years were to elapse before the invention of the microscope or the telescope, probably by Johann and Zacharius Jansen. This American review records what is not often recalled here, the considerable debt which present optical instruments owe to original work in this country, the conception of the first reflecting telescope, which was to supersede the refractor type, described by Sir Isaac Newton in 1670, and the encouragement by Chance Brothers of immigrant innovators during the 19th century. The first of these was the political refugee Bonteps, associate of the Swiss family of Guinard which preserved and developed Pierre-Louis Guinard's invention, in 1790, of chemically homogeneous glass. The results of that enlightened hospitality have helped to prevent our elipse by the decisive fundamental work on new optical glass materials by O. Schott and his collaborators under the patronage of the University of Jena.

Cautionary Tale

THE need to ensure that the reducing valve is closed before the main valve is opened on a pressure gas cylinder is one of the self-evident things which, at intervals, someone or other is virtually certain to overlook. That was the situation recently at Birmingham University. The compressed hydrogen did what was to be expected, immediately blasting off the rubber tubing connecting it with the apparatus in which the hydrogen was to serve in an experiment, but it also produced a highly alarming incidental effect which would not readily have been foreseen. It instantly ignited, although there was then no evident source of ignition in the laboratory. The gush of flame suggested the possibility that a combustible formation might accidentally have been produced in the cylinder, an alarming theory which Professor Garner and Dr. Townend, of the University, have rejected. Their view favours the probability that ignition was due to an electrostatic spark discharge, the initial rush of gas setting up a potential difference with the formation of an electric charge on the dry rubber tubing. That briefly is the cautionary tale which is presented, perhaps to have salutary results, in the first issue of the *Birmingham University Chemical Engineer*. Since no one was hurt, the incident can be regarded as a useful elementary exercise in foreseeing ignition risks where none is apparent.

CHEMICAL ENGINEERING'S NEEDS

Too Little Research and Process Development

THE relatively short history of the Institution of Chemical Engineers and its rapid rise to recognition and respect among engineering industries were recalled by the principal guest, Sir Walter Benton Jones, at the annual dinner which followed the corporate meetings in London on April 14.

Sir Walter proposed the toast of The Institution of Chemical Engineers. He recalled that, founded in 1921, it was the youngest engineering institution and he congratulated it on having "joined the aristocracy of the society of engineers." He believed that only in Great Britain and the U.S.A. were chemical engineers sufficiently organised to have gained recognition as a single profession.

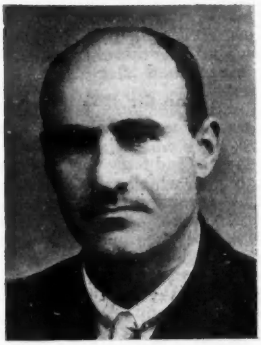
The Institution rightly regarded a chemical engineer neither as a chemist nor a mechanical engineer, but as a separate species; a man having a sound training in the fundamental sciences and in such parts of engineering and metallurgy as were necessary for the design, construction and operation of plant in which a wide range of physical and chemical processes took place.

The universities recognised the special training required to make a chemical engineer; London, Cambridge, Birmingham and Leeds universities each provided a suitable course leading to a first degree. The Institution encouraged the training of more men and had emphasised the need to provide more facilities for that training. Sir Walter wished the Institution prosperity and rapid progress. He associated with the toast the name of the president. He recalled that when Professor Newitt took charge of the Faculty of Chemical Engineering in the Imperial College of Science he had had not more than 15 students; now he had under his guidance 150.

Scope for Improvement

The President, Professor D. M. Newitt, replying to the toast of the Institution, said he had been reliably informed that chemical engineers were slowly penetrating into the iron and steel industry, and he had reason to believe they had made some useful contributions in connection with ores and gases, and some of the actual steel processes.

One of the Institution's preoccupations during the year had been technological education, but he doubted if there was anything new to say about this at present. Their membership had gone on increasing very satisfactorily. They now had a membership of well over 2000. There was, however, not one lady member—in full membership.



Professor D. M. Newitt

All the processes about which they made such a to-do in their scientific papers were conducted, as it were, in the kitchen, with the most primitive apparatus. They had drawn the attention of the Government to the fact that there were still not sufficient facilities provided for research, and as a result of their representations their vice-president, Mr. H. W. Cremer, had been appointed to the committee set up to discuss this matter. He believed their institution would perform a further valuable service to industry when it had completed this inquiry.

Although every industry seemed to need more and more chemical engineers, it was still a sad fact that in many industries they were still under the domination of foreign influence. In some quarters it was considered not a bad thing to let the other man do the development work, and when he had overcome all the troubles to buy the "know-how" from him. We started the things in this country but we did not develop them. That was particularly the case in regard to atomic fission.

He regarded this as an entirely bad policy. There was no more disastrous

policy than for an industry to fail to develop its processes and to look to someone abroad to do it. That killed initiative and the things that we brought were not up to date. Worse still, we did not get the experience and training that could be obtained in the process of development. We should do our best to circumvent that situation. It applied in only a few industries, but in those industries it was having a very bad effect.

Time for Boldness

This was an age in which we could not afford to have misgivings; it was an age for boldness. Industry faced a very great adventure, in which, if they were to be successful, their young members must play their part. They must have the enterprise and the imagination to undertake the big jobs. From what he knew of them, he was sure they would prove themselves worthy of the age and raise the status of chemical engineering.

The past president, Mr. H. W. Cremer, C.B.E., gave a warm and entertaining welcome to the many distinguished people present, proposing the toast of "The Guests." He coupled with it the names of Mr. A. P. L. Blaxter, master of the Worshipful Company of Founders, and Dr. D. T. A. Townend, president of the Institute of Fuel. Acknowledging the value of the latter's distinguished academic and professional career, he ventured the suggestion that, as director of the British Coal Utilisation Research Association, Dr. Townend, in recognition of the high proportion of incombustible matter which came in coal today, should not ignore the interests of rock gardeners when he prepared his reports.

Dr. Townend, who in his response conveyed the greetings of the kindred institutions and societies, congratulated the institution on having maintained its educational and qualification requirements, and upon the further extension of chemical engineering courses and facilities in the provincial universities. Adequate attention was, however, not being paid to the services which the universities could render, if they were given adequate support. Many of the provincial universities were started with the express purpose of helping industries. Had they earlier been given appropriate national support, as distinct from industrial support, the position would have been very different today. The tragedy was that national support had been so belated. Support from industry to the universities had been gratifying, as a whole. Leeds University was greatly indebted to the benevolence of Mr. Charles Brotherton; the new plans provided facilities for chemical engineering work, as well as on ancillary subjects.

Mr. Blaxter also responded to the toast and a final toast to the president, proposed by Mr. F. A. Greene, was accorded with musical honours.

Institution Promoting Fuller Training for Engineers

THE annual meeting of the Institution of Chemical Engineers was held in London, on Friday, April 14. The president, Professor D. M. Newitt, M.C., F.R.S., presided.

The annual report and accounts for 1949 were presented and adopted. The report showed that the rate of increase of membership had been maintained, the increase in 1949 being 212, bringing the total to 2338. The accounts reveal that the general increase of costs has produced a deficiency. It was resolved at a later meeting to increase the amount of the subscription.

Mr. L. O. Newton (hon. secretary) dealing with the institute's educational activities, referred with regret to the continued illness of Mr. J. A. Oriel (chairman of the Education Committee) and reported that Mr. J. Edwards had been appointed the institution's representative on the Chemistry and Chemical Technology Sub-Committee of the Regional Council for Further Education in the South-West.

Negotiations have continued with the Royal Institute of Chemistry on the subject of ordinary and higher national certificates in chemical engineering. Following a request by the Regional Advisory Committee for Chemical Engineering (London & Home Counties), a first draft of a syllabus for a national certificate in chemical engineering has been prepared and is before the Education Committee of the Institution.

The Chemical Engineering Sub-Committee of the Academic Board of Technology for Wales has recommended the establishment of a degree course in chemical engineering in the University of Wales; and a course in chemical engineering is being established at the Birmingham Central Technical College.

The report recorded that, in view of the growth of the institution and its increas-

(*continued at foot of next page*)

STEEL SCARCITY IS ENDING

March Production Equalled 17 m. Tons a Year

OUTPUT of steel in March established a new record, when for the first time production exceeded an annual rate of 17 million tons.

Weekly average output was 329,800 tons, equal to an annual rate of 17,147,000 tons. This compared with the record of 16,898,000 tons set up in February and was 1,274,000 tons higher than the figure for January.

Total output for the first quarter of this year was 4,169,600 tons, or 207,000 tons more than in the first three months of 1949. This represents a considerable step towards the achievement of a total of between 15.75 and 16 million tons foreshadowed in the Government's Economic Survey for 1950.

It is pointed out, however, by the British Iron and Steel Federation that the effect of holidays later in the year must be borne in mind.

Influences which have helped the expanding production are the high level of iron ore imports during the winter months —particularly from North Africa—and good scrap supplies from Germany.

Another contributory factor has been the continuous working week in force since 1947, and the good labour relations which continue throughout the industry.

Future prospects may be influenced by the devaluation of sterling. It is widely felt, however, that there is little justification for the continuance of the steel allocation scheme.

Production of pig-iron also showed an increase in March, being at an annual rate of 9,696,000 tons, compared with 9,295,000 tons a year ago. Details issued by the British Iron and Steel Federation are :—

STEEL INGOTS AND CASTINGS

(Tons)

	1950		1949
	Weekly Average	Annual Rate	Weekly Average
January ...	305,300	15,873,000	288,500
February ...	325,000	16,898,000	311,100
March ...	329,800	17,147,000	312,900
1st Quarter ...	320,700	16,679,000	304,800

FULLER TRAINING FOR ENGINEERS

(continued from previous page)

ing responsibilites, the council has appointed Dr. John B. Brennan, M.Sc., Ph.D., A.M.I.Mech. E., as general secretary, to be responsible for much of the work hitherto carried out by the hon. secretaries. Dr. Brennan has been principal and secretary of the Portadown Technical School, Northern Ireland.

The annual report also referred to the Institution's activities in connection with the co-ordination of research in chemical engineering. It recalled that, as a result of representations on behalf of the Institution, the Council of the Department of Scientific and Industrial Research has set up a committee to consider the whole question. The immediate past president of the Institution, Mr. H. W. Cremer, is the chairman of the committee.

The following elections were announced for the ensuing year: President, Prof. D. M. Newitt; vice-presidents: Mr. M. B. Donald, Mr. F. A. Freeth, Mr. A. E. Leighton, Mr. J. A. Oriel; hon. secretary: Mr. L. O. Newton; hon. treasurer: Mr. F. A. Greene; members of council: Mr. N. C. Fraser, Mr. F. H. Garner, Mr. A. G. Grant, Mr. H. Talbot; associate member of council: Mr. A. P. Buchanan.

Medals and certificates for 1949 were presented by the president. The awards were these: Osborne Reynolds Medal, to Dr. F. Rumford, for his valuable services to the Institution, particularly in connection with the associate membership examination, over many years. Moulton Medal: for a paper on "The Fabrication of Chemical Plant in Stainless Steel," by Mr. A. C. Branch and Mr. J. L. Sweeten (associate member). Junior Moulton Medal: for a paper on "The Mechanics of the Displacement of Liquids from Porous Solids," by Mr. D. I. W. Atkinson (graduate). William Macnab Medal: to Mr. Michael Shaw, for the best set of examination papers submitted in the 1949 associate membership examination.

Votes of thanks were accorded the president and the honorary officers and members of council for their work on behalf of the Institution. Dr. H. Levinstein, speaking on this subject, welcomed the great advance which had been made during Prof. Newitt's term as president, and that of his predecessor, in the standing of the Institution.

Recognition of long service to the Institution in another regard was paid by the presentation of a cheque to Mr. H. Talbot, who for more than 20 years has been the Institution's honorary registrar, an office which he now relinquished. The president and Mr. F. A. Greene both spoke of his valuable service in that capacity.

£11 m. FOR COKING PLANTS

New Ovens and Reconstruction

THE Coke Oven National Consultative Council composed of representatives of the National Coal Board, the Coke Oven Managers' Association and the National Union of Mineworkers, at its second meeting in London on April 12, reported that progress was being made in the establishment of consultative machinery in the divisions and at individual coking plants.

Mr. L. O'Connor, director of carbonisation to the National Coal Board, gave an account of the plans already approved by the board in the building of new plants and the improvement of existing ones at a cost of more than £11 million. The board, he said, was considering still further improvements.

Industrial diseases among coke oven workers, and the provision of bathing facilities at coking plants, and of protective clothing, were also discussed.

Texas Disaster Finding

JUDGMENT has been given against the U.S. Government in the test damage suit filed to determine liability for the ammonium nitrate explosion at Texas City, in April 1947 (THE CHEMICAL AGE *56*, 497). The judge held the Government was responsible for the blast and accused it of "blunders, mistakes and acts of negligence." The Government is expected to appeal to the highest court. The negligence of the Government was stated to have "reached its peak when it caused or permitted the fertiliser on the two ships principally concerned to be sent to Texas City and there to be handled, unloaded and loaded into ships for shipment abroad."

Among the pending suits for damages, totalling some $200 million, the largest claim is that of the Monsanto Chemical Company, which seeks damages of $50 million. There is also a claim for $11 million by the compensation insurer for Monsanto.

Radioactive Dye Catalyst

SOME American textile concerns are about to introduce what is believed to be the first fundamental change in dyeing procedure for the past 400 years. The dyestuff is developed in a chamber containing a powerful combination of special lamps. Dyestuffs used are a special form of sulphur, diphenyl and naphthol

(continued at foot of next column)

ISOTOPES BY AIR

Value of Light Containers

THE increase in the past two years of the use of aircraft for the carriage of radioactive isotopes is mentioned in a press notice issued this week by the Ministry of Civil Aviation. This describes the comparatively new method of carrying the radioactive material in the wing tips of certain South African Airways aircraft, which dispenses with the need for a heavy lead shield, which previously has rendered the packages a substantial factor in the total of freight.

Now a felt-lined compartment with a hinged lid, painted red, is housed in one of the wing tips, in which the isotopes are packed in a metal cylinder, 4 in. long by 1½ in. in diameter. The cylinder has a "screw-on" top to which is attached a ring for easy handling with a 3-ft. rod to which a hook is affixed.

Radioactive materials do not, of course, damage the structure of an aircraft, or its equipment, but the radiation can cause damage by fogging to undeveloped photographic film. To minimise such effects, consignments of isotopes are packed in containers which fully absorb some types of radiation and reduce the intensity of others. There would be no danger to the health of passengers or crew unless they remained within three ft. of the package for a few hours.

Maximum Radiation Rate

The radiation at the surface of packages of radioisotopes carried by air in the United Kingdom may not exceed 100 milliröntgens per hour. Consignments with the maximum radiation have to be kept three feet from persons and livestock and nine feet from undeveloped photographic film.

The weight of the chemical substance carried in a consignment is usually less than 1 oz.

materials. They are padded on to the fabric in one bath with a radioactive catalyst. The reaction, as the fabric enters the light chamber, is described as almost instantaneous.

Development is reported to be advanced and to have indicated that it may be possible in many cases to eliminate the final washing stage. Complete dye penetration as well as evenness are claimed. It is expected that the new method will be in use shortly at the recently organised works of the Shamrock Textile Processing Co., Paterson, N.J.

THE SCOPE FOR TONNAGE OXYGEN

Its Importance in Iron and Steel and Other Industries

THE interest attached to the quantity production of oxygen for industrial purposes has been widened by the support given to the conference held in Paris (April 12 to 14) to discuss the possibilities of co-operative research in the field of tonnage oxygen. This conference was held at the suggestion of ECA and was attended by delegates from all countries receiving Marshall Aid.

Considerable progress has been made in the technology of oxygen production by fractional distillation, which in conjunction with the transport and storage of liquid oxygen has resulted in considerable economies for large consumers. The most recent advances have been in the development of large-scale oxygen plants for installation on the site. The purity of the oxygen produced is normally from 90-95 per cent, but attention has also been devoted to the supply of enriched air with an oxygen content ranging from 40 to 60 per cent.

The only type of plant which so far has been extensively used for the production of medium-purity oxygen on a large scale is the Linde-Frankl, which has already found many applications in the metallurgical, carbonisation and chemical industries. The capacities of some existing plants range upwards from about 50 tons per day. Considerable interest has also been taken in the Kellogg plant, while various other cycles have been suggested which have not yet been tested on an industrial scale.

Limitations

So far the principal disadvantage of tonnage oxygen plants is their inflexibility. A Linde-Frankl plant, for instance, is economic only if run continuously at full load. Until this difficulty has been overcome the scope for tonnage plants seems to be limited to the relatively small number of consumers whose daily requirements are both continuous and extremely large.

The British Iron and Steel Research Association has devoted considerable attention to the use of oxygen both for enhancing flame propagation and temperature during heating and melting operations, and as a chemical agent to increase the efficiency of a purification reaction.

Oxygen has been applied to open-hearth furnaces for both these purposes. The fact that the oxygen flame is appreciably hotter than a normal air flame enables it to be used to accelerate the melting process, but the roof strength sets a limit to this use. The roof is the weakest part of an open-hearth furnace. If, as is generally the case, it consists largely of silica, it melts at a point some hundreds of degrees below the flame temperature, so that oxygen can be added safely only if the extra heat is dispersed downwards and not to the roof.

This often limits the employment of oxygen to the stage at which the mold material is being loaded into the hearth. The difficulty might eventually be alleviated by the installation of all-basic roofs constructed of chrome-magnesite, which would add another 100 degrees or so to the critical roof temperature.

Optimum Results

It has been shown that this application is economically worth-while under certain conditions, the best results being recorded for cold-charged furnaces, which are more common in Britain than in the United States. To obtain optimum results, however, it would be necessary to redesign existing works in order to speed up charging, which is usually governed by the rate at which scrap can be brought to the furnaces.

Oxygen might also be liberally used in a gas-fired furnace to enable the furnace to be successfully operated on a gas of low calorific value. Normally blast furnace gas has too low a calorific value for this purpose, but it has been calculated that if sufficient oxygen could be added to give an effective air enrichment up to 38 per cent, a gas-fired open hearth furnace could be operated on blast furnace gas alone.

In normal open-hearth furnace practice the oxidising reactions of the fully melted bath and slag are assisted by the addition of iron ore or mill scale. It has been found that this reaction can be hastened by the introduction of gaseous oxygen into the bath either through temperature tubes or by means of high-velocity jets through which the gas is blown at high pressure. Oxygen as been satisfactorily injected into the bath of a British furnace at a pressure of about 75 p.s.i. By this means the rate at which carbon was recovered was accelerated to roughly three times the normal speed.

The practical value of this application, however, is still in doubt, particularly where the carbon content does not require to be reduced to less than about 0.2 per cent. On the other hand, where a carbon content of 0.5 per cent or lower is required, oxygen has definite advantages, since the last traces of carbon are the most difficult to remove and by normal methods this process is necessarily slow.

Faster Working

In the converter, oxygen can be used to shorten the blowing time and so increase productivity. This has been accomplished with both practical and economic success in a side-blown converter in Brtain and also a bottom-blow converter in Germany. In both instances oxygen was used to enrich the normal oxygen content of the blast from 21 to 30 per cent. This had the effect of removing a large quantity of inert nitrogen from the blast, resulting in hotter steel and faster working.

Oxygen has been used in electric furnaces either in lances or jets in precisely the same manner as in open hearths. There are several reasons why the addition of oxygen is particularly advantageous here. In the first place, the cost of power represents a very high proportion of the total steelmaking cost, so that the saving in fuel would be greater than in an open hearth. Secondly, electric furnaces are extensively used for the production of low-carbon steels, where oxygen can most effectively be employed. A third consideration is the absence of an oxidising atmosphere, the effect of the oxidising power of the gas being therefore greater than in an open hearth.

Because of these special factors oxygen can be economically used in electric furnaces even at its present price of 10s. 6d. to 12s. 6d. per cu. ft. The largest electric furnace ever built, however, could never absorb the output of a tonnage plant, the average capacity of which would be from 15 to 20 tons daily. Even with an output of 60 tons a day, working three shifts, a furnace of this capacity could not consume more than 100,000 cu. ft. of gas, i.e., between 4 and 5 tons.

From the standpoint of quantity consumption, the most favourable field for tonnage oxygen is probably the blast furnace, which works continuously day and night. Enrichment of the blast has been advocated both to accelerate consumption and to reduce the coke consumed per ton of pig iron. On economic grounds, however, the value of such enrichment is debatable, since the reduction in coke consumption is barely sufficient to offset the cost of the oxygen. Moreover, the use of an enriched blast raises the temperature of the furnace opposite the tuyeres, and for some purposes that is undesirable.

Enrichment with oxygen may make the furnace work faster and permit the use of lower grade coke, but it is liable to have a deleterious effect on the product and may also interfere to some extent with the blast furnace gas, which is extremely useful as a fuel throughout the steelworks.

These are among the reasons why research has largely been confined to blast furnaces producing ferro-manganese, where both temperature and coke consumption are relatively high. It is also possible that enrichment with oxygen might prove successful in the field of high-grade ferro-alloy manufacture for products such as ferro-chrome. It was even suggested that attempts to reduce chrome ore to ferro-chrome might be undertaken in a furnace blown entirely with oxygen. This has been shown to be feasible but not economical.

Unquestionably unlimited supplies of cheap oxygen would be a valuable asset to steel producers, but the inflexibility of tonnage plants seems to render them unsuitable for most of the requirements of this industry. The purity of the gas is not of material concern, but the supply would have to be flexible and not too large.

Technical Difficulties

What the industry needs is a small oxygen plant which could operate in the consumer's works and produce gas intermittently at a reasonable price—say 5s. per 1000 cu. ft. Alternatively, its requirements might be met by a system of storage whereby the oxygen could be kept in a gas holder for distribution as required. This involves certain technical difficulties, since the gas is damp, has impurities and rapidly promotes corrosion.

Another obstacle to the profitable use of tonnage oxygen is the progress made during the past 25 years in increasing the speed at which furnaces operate. In general, open hearths are now considerably faster than they were 30 years ago and the limiting factor is the handling of scrap supplies and the general logistics of plant layout. Faster melting would further increase these problems. In many steelworks the use of tonnage oxygen would necessitate extensions to casting pits, scrap yards, etc., and a very large expenditure of capital. It remains to be seen whether the advantages would be sufficient to justify the immense reconstruction programmes.

ACRYLIC RESIN EMULSIONS

Paper Industry Finds Some New Uses

From A SPECIAL CORRESPONDENT

THE paper industry is displaying a growing interest in the use of non-ionic, acrylic resin emulsions for the formulation of greaseproof coatings and as a binder for clays and colours in decorative coatings which must have good resistance to discoloration during ageing.

Suitable acrylic resin emulsions demonstrate high stability under mechanical pressure and excellent tolerance for a variety of inorganic salts. Moreover, films deposited by these emulsions will remain colourless and crystal clear even after ageing, flexible and moderately extensible and elastic.

An American firm, which has pioneered these particular applications of resin in the paper trade, reports that one of its products has been examined as a coating for a variety of papers. By its use, it states, it is possible to produce continuous, completely greaseproof coatings on 60 lb. patent board in one pass at coating weights as low as 1.9 to 2.4 lb./1000 sq. ft.

Coating Weights

Where a partial proofing against grease is desired, good results have been obtained at a coating weight of 0.9 lb./1000 sq. ft. Where the base stock is less porous, deposition of continuous greaseproof films is possible in one pass at coating weights of 1.5 lb./1000 sq. ft. These latter results were obtained on super-calendered bleached Kraft.

When used as a binder for high or low grade clays in pigmented coating compositions for paper, acrylic resin emulsions improve the handling characteristics and stability of the coating dispersion. It is also claimed that addition of suitable emulsions does not raise viscosity appreciably. Thus pastes containing 60 per cent solids exhibit viscosities suitable for use on standard equipment. The films exhibit excellent binding and superior ageing properties.

The acrylic resin emulsion may be modified with starch or casein. Where starch is used, the resin improves flexibility and aids in calendering, but, in general, the properties imparted to the coating by the resin are reduced as the percentage of starch increases. Where casein is employed with resin emulsion as a binder for clay, the resin film contributes superior resistance to yellowing during exposure to ultra-violet light, as compared with combinations of casein and other emulsions used as binders.

There are a number of factors contributing to the success of acrylic resin emulsions in the formulation of paper coatings. For example, the most suitable acrylic emulsions have a 40 per cent solids content and specific gravity 1.08 (25° C./25° C.). They are not affected by many acids, bases, salts and organic solvents which coagulate less stable dispersions.

Necessary Properties

Mechanical stability of acrylic resin emulsions to be used for coating work must be of a high order. Paper makers require that such emulsions should be capable of being passed between the rolls of a paint mill, set barely to pass the emulsion, with essentially no breaking. The resin emulsions should show a high stability with thickness such as concentrated water soluble polymers, e.g., sodium carboxy methyl cellulose.

Suitable emulsions should be capable of being plasticised with other resinous compounds to increase the flexibility of the film, without sacrificing its excellent ageing properties. Common additives include acrylic resin dispersions, nitrile rubber latex, natural rubber and synthetic (neoprene and GR-S) latices, butadiene-high styrene latex and polyvinylidene chloride latex.

The acrylic resin emulsions chosen for paper coating work should be without effect and indifferent to common pigments, such as chrome yellow, iron oxide, cadmium red, ultramarine blue, phthalocyanine blue, titanium oxide, carbon blacks, chrome oxide and organic red. Starch and casein must have no deleterious effect on the emulsion, which should mix readily with these substances.

Success in coating paper with formulations containing acrylic resin emulsions of the non-ionic type depends, of course, on a number of variables, among them being such things as the degree of porosity of paper stock, maintenance of a proper balance of coating, viscosity and solids, and proper control of bubble formation by adding such compounds as capryl alcohol.

Fluorine & Nickel Hazards: the Medical View

THE need for rigorous precautions when handling chlorine compounds was stressed by Dr. Donald Hunter at a conference held in London last month under the auspices of the Medical Research Council.

Dr. Hunter was speaking on fluorosis and beryllosis as industrial and community health hazards, and a summary of his paper, and of others, is published in the *British Medical Journal* (April 15, p.899).

The worst danger arose from the volatility and extremely corrosive nature of the vapour of anhydrous hydrofluoric acid. Both hydrofluoric acid and fluorine, if inhaled, attacked the larynx and trachea. The ultimate result was slow ulceration of the gums, nasal mucosa, larynx, bronchi, and conjunctivae. Dr. Hunter advised that locally applied exhaust ventilation should be used to remove gases as near to their point of origin as possible, and mechanical methods substituted for hand labour.

Fluorescent Tubes

A considerable hazard existed in preparing and mixing the powders which coated the tubes of fluorescent strip lamps and certain tubes used for electric signs. The compounds involved were zinc beryllium manganese silicate, zinc beryllium silicate, and beryllium oxide.

There were many reports of dermatitis and acute respiratory illness occurring among workers handling beryllium compounds. Dermatitis might be severe, and sensitisation, once established, was permanent. Pulmonary lesions were much more severe and disabling.

Workers should be seen at regular intervals by a doctor and repeated medical and X-ray examinations should be made of all workers with unexplained symptoms, particularly respiratory symptoms.

The existence of the hazard of non-occupational beryllium poisoning in the neighbourhood of factories presented a challenge not only to the guardians of health in industry but to public health authorities in industrial communities.

Use of BAL

The use of experimental pathological techniques for the assessment of the toxicity of chemical compounds was the subject of a paper by Dr. John Barnes, director of the MRC Toxicology Research Unit.

Dr. Barnes referred to some current work on the use of BAL (dimercaprol) in nickel poisoning. Experimentally it was found that rats poisoned by nickel carbonyl were made worse by BAL; rats poisoned by nickel sulphate by injection were not benefited by BAL, and rabbits poisoned by nickel sulphate were saved by BAL. Thus, is was not known yet whether BAL would make a poisoned man better or worse.

In the past BAL had been used first on man in cases of metal poisoning and the point of his remarks was not directed at all against the value of this substance. It did, however, emphasise the difficulties of interpreting laboratory experience in terms of clinical practice.

India's Steel Programme

ONE MILLION tons of steel is India's production target for 1950. The Government, having considered a report by three steel companies, has decided to establish steel works in the Madhya Pradesh and Orissa; it has also sanctioned a loan of Rs. 5 crore to the Steel Corporation of Bengal, which plans to increase production by 200,000 tons. The Tata company also is considering expanding its capacity.

It is foreseen that steel imports this year are likely to be less than in 1949, owing to foreign exchange difficulties.

Scarcity of iron and steel continues to be acute. The production of finished steel in 1949 was about 922,000 tons and India imported 400,000 tons, mainly from the U.S.A., the U.K. and Belgium.

Power Alcohol in Bombay

THE Central Distillery of the Bombay Government, at Nazik, is expected to start production of power alcohol this year. It has progressively curtailed the production of liquors since the gradual introduction of prohibition in the State, and now manufactures rectified and denatured spirits.

Part of the machinery to produce power alcohol has already arrived and the target committee at its first meeting in New Delhi, recommended the production of 7 million gal. this year.

In 1949 the industry produced 4 million gal. and, if raw materials are adequate and transport facilities improve, it is believed that this figure can be increased to 8.4 million gal. this year.

SYNTHESIS & DERIVATIVES OF ACROLEIN

Full Review of Recent German Advances

THE considerable advances in the synthetic production and modification of acrolein, $C_2H_4O.CH_2 : CH.CHO$, and its derivatives have been reviewed by Doctors H. Schulz and H. Wagner, of the German Degussa research laboratories. A comprehensive review has been prepared of the work performed in the Frankfurt laboratories. It consists of five parts, of which the first is concerned with acrolein itself and the α = alkyl homologues (*Agewandte Chemie* 1950, *62* (5) 105-18).

A brief historical introduction contains some notes on progress in the U.S.A. and Germany, also on the method of Zimakov and Pokrovski in Russia, by which yields of 83 per cent were obtained with allyl alcohol as starting material and powdered silver as catalyst at 200° C.

The Shell Development Corporation, in U.S. Patent 2,451,485 used propylene and steam, with 0.4 per cent Cu_2O on carborundum as catalyst; the yield was 65 per cent. The authors' own experiments, beginning about 1936, in synthesising acrolein from formaldehyde and acetaldehyde are described in some detail, including the pilot plant erected in 1940-42, having a capacity of 10 tons per month, and using silica gel impregnated with 10 per cent sodium silicate as catalyst, at an optimum temperature of 300-320°C.

Reaction Products

In regenerating the catalyst with steam and air, temperatures up to 500-550° C. could be safely used. Yields were 72-75 per cent of theoretical based on formaldehyde and 79-82 per cent in respect of acetaldehyde. Reaction products included methyl alcohol and croton-aldehyde. By addition of inhibitors (0.1 per cent hydroquinone or pyrocatechol) the acrolein could be kept stable for a year or more, as Moureu has also suggested.

The third section, on derivatives, comprises the major part of the paper, and deals at length with eight classes of acrolein derivatives: acrylic acid, polyalcohol ethers, allyl alcohol, glycols and polyamines, chloro compounds, dimers, and β-picoline.

In regard to acrylic acid, various oxidation methods, such as those of the Acrolein Corporation and Distillers Company, in U.S.A., and relative patents are noted. The present authors could achieve little success with molecular oxygen. Other possibilities were conversion into higher oxidation stages—avoiding peracids, and recovery of the vinyl group by controlled oxidation (blocking the double bond). Better success was obtained by utilising the affinity of acrolein for alcohols, and the various stages whereby acrylic acid ester was obtained are schematically shown and some of the relevant Degussa German patents and applications indicated (1938).

It was anticipated from the pioneer work of Sabatier and Senderens that production of allyl alcohol from acrolein by selective hydrogenation would present difficulties, and that propionaldehyde or propanol was more likely to result.

Allyl-Alcohol

It appears, however, that Dr. Brendlein, in the Degussa laboratories, has at length succeeded in finding a catalytic method for the selective hydrogenation of α-β unsaturated carbonyl compounds by which acrolein or crotonaldehyde, up to 40-70 per cent theoretical, may be converted into allyl-alcohol or crotyl-alcohol, while about 20-50 per cent is reduced to the saturated alcohols. (Degussa pat. appl. 19.12.1942).

Before considering the fourth subclass—glycols and polyamines—it is well to recall that either the carbon double bond or the carbon-oxygen double bond reacts, according to the kind of addendum. Thus the halogens or their acids attach to the former, while HCN adds on to the latter: and hydrogen attaches to both, *e.g.*, with allyl alcohol as an intermediate in the reduction.

With the higher unsaturated aldehydes, similar in properties to acrolein, an aldol condensation is readily obtained by the removal of water from two molecules by a suitable agent.

In the present Degussa work, reference is made to what is described as the beautiful experiment of Späth with croton aldehyde and aldol (*Ber.*, 1941, *74*, 859-866, etc.) with formation of a dialdane. In research along somewhat similar lines, Prof. Helberger obtained from hydracrylaldehyde a 3-formyl-4-oxytetrahydropyrane which could be hydrogenated and reduced to the corresponding glycol. The pyrane may also be considered as a condensation of acrolein with hydracrylaldehyde and hydroxyl addition to the double bond.

Besides the tetrahydropyrane glycol, other heterocyclic compounds are present in the high boiling fraction. From the oxytetrahydropyrane there may also form, through aldoxane as an intermediate, a 3-formyl-5,6-dihydro-α-pyrane. This latter formed the base of the 1.6-dimethyl derivative obtained by Späth from dialdane by treatment with concentrated HCl. Relevant structural formulae are given in the original. The formation of polyamines, *e.g.*, 1.3-propylenediamine, by reaction with ammonia and hydrogenation is briefly noted.

Many Derivatives

Other derivatives described, together with structural formulae and methods, are: α-chloracrolein, α,β-dichlor-isobutyraldehyde, 2-chlorpropanolal, several homologues and derivatives of dimeric acrolein (2-formyl-2,3-dihydropyran) starting with the Tischtschenko reaction, and following with 2-methylol-tetrahydropyran, 1.6-hexandiol, 2-oxy-adipinaldehyde, 1.2.6-hexantriol, 2-oxy-hexamethylenediamine-1.6, amino derivatives of the 2-formyl compound, and diene syntheses of acrolein with acrylnitril and methylacrylate; and β-picolin.

In the study of polymolecular reaction products were included both the polymeric possibilities and the acrolein-pentaerythrite condensation products.

As to the former, in addition to the three known methods mentioned in the literature, the authors found that molecular increase can be effected with alkaline agents in the absence of water. With the addition of only traces of potassium carbonate or hydroxide (as an alcohol solution) to pure acrolein distilled under nitrogen, there is fierce evolution of heat and explosive reaction and a solid yellowish resin is formed.

Various forms of the reaction are discussed and, in connection with the tendency of acrolein to form hydropyran rings, it is suggested that the alkaline-induced polymerisation constitutes a continuous interchange of α-C condensation and hydroxyl group addition to the double bond of the nearest acrolein molecule. A proposed structural formula for this is given.

In regard to the acrolein-pentaerythrite condensation, the course of the reaction was studied in two stages, the first being pre-condensation and the latter resinification (see also Degussa, Ger. pat. appln. D 84823 of 9.4.41).

In the first the essential part is formation of cyclic acetals, for which the structural reactions are shown. The condensate is a more or less viscous liquid which in course of time, according to temperature, forms a solid resin. Under suitable conditions that change can be indefinitely deferred.

A rather remarkable macro-molecular formation is shown after removing water of reaction, and distillation in vacuum, whereby the double bonds of the cyclic acetals in the presence of acid catalysts could link up available hydroxyl groups (of unreacted pentaerythrite and allylidenepentaerythrite) with linkage over ether-oxygen bridges; the whole forming a system of m-dioxane rings and methyl-ethyl-ether bridges.

In the experimental part are described in detail the methods for preparing the various products, beginning with acrolein itself, methyl and ethyl acroleins, methoxy-propionaldehyde, etc., and concluding with the acrolein-pentaerythrite resin, a modified resin, and two allylidene-pentaerythrite products.

The a.-p. resin is prepared from freshly distilled acrolein (350 g.) and pentaerythrite (510 g.), the former being distilled in a nitrogen stream in a flask with thermometer and reflux. After addition of 2.8 g. of p-toluol-sulphonic acid in 5 c.c. water the mixture is heated to 75-80° and stirred for 1½-2 hr., with care to maintain an inert nitrogen atmosphere.

The reaction water is distilled off *in vac.* The viscous condensate is poured into a mould and hardens at 60-80° in 12-24 hr., and there is a loss of volume of about 15 per cent.

Behaviour With Solvents

The mechanical and electrical properties of the resin are tabulated and its behaviour with solvents and aqueous solutions. The modified resin is prepared with butanol or a fatty acid mixture by heating for an hour or two and hardening for 20-24 hr.

The diallylidene-pentaerythrite product is prepared by heating 448 g. acrolein and 136 g. pentaerythrite with 1.5 g. oxalic acid and stirring for 19 hr. in a reflux condenser, neutralising with NaOH, distilling off the reaction water and excess acrolein and fractionating the residue *in vac.*

The first fraction comes over at 107-115° and yields 168 g. of the diallylidene product; the second (115-155°) is 25 g., and the residue 32 g. By re-crystallising from 60 per cent aqueous methyl alcohol an m.p. pure product is obtained. The yield is 67.4 per cent, reckoned on the initial acrolein. A similar method is used for the allylidene-pentaerythrite, using 0.07 g. of p-toluol-sulphonic acid. Two acetals (methoxy- and acetoxy-) were also prepared from the di-allylidene material.

ADVANCING WOOL CHEMISTRY

Successful Application of Research

From A SPECIAL CORRESPONDENT

DISCOVERIES, many of them leading to new processes and fresh sources of industrial materials, are being continuously derived from current scientific scrutiny of the wool industries. Most of this is chemist's work, either in the production of new substances facilitating wool processes, of which the development of colloidal silica to serve as an " anti-lubricant " was a recent example, or the recovery and modification of waste products, such as wool grease.

The readiness of this department of research to take advantage of any aid in science or technology has lately been attested by the use by Dr. A. B. D. Cassie and his assistants at the Wool Industries Research Association Laboratories in Leeds of radioactive isotopes from Harwell. These are being employed in fundamental studies of the mechanism of wool dyeing.

A close watch for developments of potential commercial value is maintained by the International Wool Secretariat, formed by producers in the Dominions and the United States to promote the use of wool. One of the principal functions of this body is to increase the efficiency of wool as a textile fibre by the promotion of research of all kinds and the improvement of manufacturing processes.

The International Wool Secretariat promotes such research by means of scholarships, fellowships and grants to appropriate institutions, in Britain to the Wool Industries Research Association at Leeds and the Department of Textile Industries at Leeds University. Soon, research financed by the Secretariat will be started in Switzerland and possibly in the Western zone of Germany.

Research Results

As part of its technical information service, the Secretariat holds exhibitions of new developments, based on research discoveries which are of practical value to textile manufacturers.

In many of the processes by which wool fibres are manipulated—such as carding, combing, drawing, spinning, etc.—the individual wool fibres are required to slip over one another in a controlled manner. The traditional methods of processing involved the control of this friction between fibres by the addition of such substances as olive oil or oleic acid, which, on storage, thicken and therefore increase the "drag " of one fibre over another

A more convenient means of controlling this property is the application of the colloidal solution of silica (Monsanto Chemicals' Syton). This material consists of a stable dispersion of sub-microscopic particles of silica in water. The particles are about 1/400,000 of a centimetre in diameter and are non-crystalline in appearance. Relatively small amounts, placed on wool fibres, increase the drag and enable them to slip past one another at constant speed.

Increased Production

In worsted manufacture, this increased coefficient of friction can be used in several ways. It permits spinning to a finer count, procures fewer yarn breakages in spinning to a given count, and reduces the twist needed in the yarn for a given strength. Thus production is increased and there is less waste.

In woollen manufacture a suitable addition of the silica dispersion may increase the breaking strength of the spun yarn by 10 to 30 per cent. The silica is completely removed by mild piece scouring.

Another relatively new substance whose commercial use has been furthered by the wool industries is alginic acid, extracted from certain kinds of seaweed. After conversion to calcium alginate, it forms a synthetic fibre which, though reasonably strong when dry, dissolves completely in warm solutions of alkali.

The use of this type of rayon to produce lightweight and novel fancy fabrics is well known; a newer interesting application is in the manufacture of men's seamless socks. These are usually knitted one after the other, end to end, and the hand cutting employed to separate them sometimes produces an unfinished edge to the sock. In the new method, a few rows of stitches between the socks are knitted in alginate rayon and when the finished goods are washed in the final processes the alginate dissolves.

The traditional use of chlorine in wool treatment is primarily to increase resistance to felting during laundering. Another unexpected advantage now makes the

chlorine process even more attractive. It is easier to wash oil-bound dirt from chlorinated wool than from untreated wool. The original surface of a wool fibre is atractive to oil but repellent to water. After chlorination, however, the wool becomes attractive to water and therefore repellent to oil and the latter then offers little resistance to detergents.

Raw wool may contain from 6-50 per cent of wool grease, the removal of which during scouring gives rise to factory effluents of a kind which in some countries may not be discharged to sewers or rivers.

Wool Grease

That crude wool grease can be refined to give substances like lanoline, or can be compounded into paints and other industrial products has been well known and the practical development of the principle was stimulated by the war. Wool grease can, for example, yield one of the most efficient rust preventives known. This was employed very extensively during the war on Allied military equipment in the humid atmospheres of tropical countries.

More recently, it has been found possible to separate some of the pure chemical substances present in the original mixture. Using these as raw materials, new departments of organic chemical industry may be established. The beginning of such development can already be discerned.

Much wool grease is recovered from sewage at a central works in Bradford, but it is very dark in colour. Nevertheless, it is affording an effective starting material for the production of drying oils suitable for paint manufacture, washable water paints, railway wagon axle grease, etc. Direct separation of the grease from wool scouring liquors, either by acid cracking with sulphuric acid, or by centrifuging, is giving a lighter and purer product, from which are prepared the fine grades of lanoline used in pharmacy and to form the base of many kinds of cosmetics.

Lanolin

Lanolin consists chiefly of a complex mixture of esters formed by a combination of the alcohols cholesterol, *b*-cholesterol, agnosterol and lanosterol, together with some 30 different acids. The character of these acids is still presenting considerable problems to organic chemists. It is in connection with the cholesterol constituent, which forms 15-20 per cent of the lanolin, that most commercial developments have taken place.

By new methods, sometimes using an addition compound of oxalic acid, cholesterol can be prepared in 100 per cent purity. Such vital materials as vitamin D and the sex hormones, testosterone, progesterone, etc., which have wide clinical uses, are now synthesised commercially from cholesterol. Sex hormones previously have been obtained by a laborious process of extraction from the glands of animals.

The separation of lanolin from wool grease has been carried on as a commercial process for many years and the use of the former as a base for cosmetics is general. An unforeseen development in this field was the exploitation by some wool manufacturers of the possibilities of turning the wool grease from their own scouring departments into cosmetics. In the U.S.A., Botany Worsted Mills, Inc., making fine quality worsted fabrics, is employing the recovered wool grease to make high grade cosmetics.

The control of clothes-moths and the mothproofing of woollen garments are problems to which the attention of chemists has long been directed.

It is generally supposed that the unique ability of moth grubs to digest wool is due to the presence in their intestinal tract of an enzyme capable of breaking the disulphide bond, the special linkage in the wool molecule which is largely responsible for the strength and insolubility of wool fibres.

Novel Moth Proofing Method

A novel method of mothproofing has, therefore, been proposed, in which a proportion of this bond would be chemically replaced by an entirely new—and indigestible—linkage. The Disulphide linkage,

$$C - CH_2 - S - S\ CH_2 - C$$

would give place to

$$C - CH_2 - S - CH_2 - S - CH_2 - C.$$

This change had previously been made in the laboratory by reduction with calcium thioglycollate followed by relinkage with methylene dibromide, but such costly reagents made the process impracticable from a commercial standpoint. Recently, however, cheaper reagents capable of producing the same change have been suggested; *e.g.*, sodium hydrosulphite and formaldehyde. This method is not yet known to be in commercial use and it is not certain what other slight changes in colour, handle, etc., might be simultaneously produced, although laboratory experiments do not suggest there would be any severe deterioration.

Should such a process prove successful, it would give protection as permanent as the life of the fibre itself. It is probable, too, that wool altered in this manner would have increased resistance to attack by alkalis in scouring or laundering.

ISOLATION OF VITAMIN B_{12}

Another Red Factor Separated

by Dr. E. LESTER SMITH*

THE efficacy of liver in treatment of pernicious anæmia was discovered in 1926, but it was not until 22 years later that the active principle—now known as Vitamin B_{12}—was isolated in crystalline form.

In 1948 the achievement was announced independently by Folkers and his co-workers in America and Lester Smith in Britain, within a few weeks of each other. Much delay was caused by difficulties in testing and the need for clinical evaluation, and microbiological assay has only recently been available. (Shorb, in America, used *lactobacillus lactis* Dorner as the test organism).

Owing to absence of particular chemical properties, the vitamin has had to be isolated from liver by methods almost exclusively physical. These included adsorption (charcoal or alumina) and partition chromatography (using damp silica and butanol). In the latter method, three coloured zones were obtained; brown at the top, pink in the middle and yellow at the bottom. Dr. C. C. Ungley found by clinical tests that nearly all the activity was concentrated in the pink fraction, which indicated the further work.

Purification Difficulties

Persistent peptide impurities impeded further progress until they were destroyed by protolysis, using trypsin; after further lengthy purification by chromatographic methods and subsequent concentration the pure vitamin was ultimately obtained as deep red crystals from aqueous acetone. The immensity of the task can be appreciated when it is known that 1 ton of liver was required to give 15 mg. of pure vitamin B_{12}.

The substance has a phenomenal potency producing haemopoietic response in pernicious anaemia in doses of about 0.001 mg.; folic acid of 5000-10,000 times this amount is needed for the same response.

A remarkable feature of this vitamin is that it contains about 4 per cent of cobalt, this being the first time that the metal has been found in a pure material of biological origin.

The most characteristic physical property of this substance is its absorption spectrum; X-ray crystallography has confirmed its molecular weight of 1650 100 for the hydrated substance. The chemical formula is given as

$$C_{61-64}H_{86-92}N_{14}O_{12}P\ Co$$

The research work on the animal protein factor has shown that it could be synthesised by certain intestinal bacteria.

This led to the possibility of its being produced by fermentation methods and it has been discovered that it can be synthesised by *streptomyces griseus*, which is used in the commercial preparation of streptomycin. Industrial preparation of purified vitamin B_{12} concentrates from this source is now in operation here.

Vitamin $B_{12}b$

Interest in the work on anti-pernicious anæmia did not slacken with the isolation of vitamin B_{12} and already another red factor, vitamin $B_{12}b$, also clinically active, has been separated, using chromatographic techniques.

In the discussion which followed, both Dr. Herd and Dr. Pankhurst asked about the loss of the vitamin on charcoal and Dr. Lester Smith replied that little was known about resulting inactivation which might be due to destruction or irreversible adsorption; X-ray methods might have given information about the structure of the molecule.

Mr. Garrod was informed that absorption spectra technique was not suitable for assay purposes, because of interference by other substances present.

The function and mode of action of vitamin B_{12} in the human body was raised by Dr. Young, who was told that the vitamin seemed to be necessary for normal nutrition and is concerned in some manner with the replacement of the red blood cells. Even pernicious anæmia patients excrete vitamin B_{12} but suffer from some form of stomach atrophy which prevents absorption by the intrinsic factor.

Dr. Lester Smith also disclosed that he and Dr. Ungley had been working on yeast extracts which undoubtedly contained a potent anti-pernicious anaemia substance which was not vitamin B_{12}. More work on the Wills factor was needed.

* Summary of a paper presented before the London and South-Eastern Counties Section of the Royal Institute of Chemistry at Acton Technical College on February 14. The chair was taken by Dr. C. W. Herd.

DRUGS AND FINE CHEMICALS IN 1949—V

Popular Adoption of Antihistaminics

by G. COLMAN GREEN, B.Sc., F.R.I.C., A.M.I.Chem.E.

THE second development of importance in the antihistaminic field during 1949 has been the application of these drugs in the treatment of the common cold.

The development is derived from the initiating work of J. M. Brewster, which was carried out at a U.S. Naval Hospital. Since his findings were made known this use of antihistaminics has been the target of a fantastic degree of non-ethical commercial exploitation in U.S.A.

Effects of Benadryl

Impressed with features which were characteristic both of allergic reaction and the early stages of the common cold, Brewster was led to explore the effects of benadryl (the dimethylaminoethyl ether of benzhydryl) in the latter and his first results were reported in 1947 (*U.S. Nav. Med. Bull.*, 1947, 47, 810). He later carried out a more comprehensive series of tests and these were presented during the past year (*U.S. Nav. Med. Bull.*, 1949, 49, (1), 1). A number of antihistaminic drugs were tested under controlled conditions.

Brewster reached the conclusions that the common cold is an allergic reaction in the initial phase and, provided antihistaminic drugs were administered *during the initial phase*, the common cold could be aborted with a high degree of success. The effectiveness of the treatment was found to be inversely proportional to the lapse of time between the onset of symptoms and the administration of the drug.

Brewster's theory is that the cold is checked when the administered antihistaminic drug reverses the allergic reaction before the mucuos membrane becomes damaged and the protection it affords from pathogenic organisms is lost. He points out that a common cold provides immunity lasting from three to seven weeks, and this immunity was reported to develop even when the cold was aborted by the antihistaminic drug. But the " cure " of a cold was found to be increasingly difficult with the lengthening of period since the last attack and, lacking immunity, it was found necessary in such cases to repeat the dose of antihistaminic drug at intervals of 2-5 days, especially during times of epidemic. Brewster actually suggests that it might be more satisfactory to *select* a cold of a mild variety in order to build up immunity.

The " cold-cure " market is of unique dimensions in any country, and it is not surprising that in America many commercial organisations found this new field of therapy immediately ready—if not quite ripe— for the harvesting. In that country the cold-remedy market has been estimated to be worth $100 million per annum and it is claimed that in four weeks sales of one of these new proprietary products totalled $1 million.

The rush to manufacture drugs of this group precipitated acute shortages of intermediates, especially of lithium amide, which is required as a condensing agent, notably in the manufacture of pyribenzamine, which may be taken as a typical example of compounds of the antergan type.

The demand for lithium amide has been reported to have increased twentyfold over the past year. Other drugs reported to have been in demand as intermediates are anisic aldehyde, α-aminopyridine, thionyl-chloride, diethylaminoethanol, thiophene, etc.

U.S. Publicity

A vast amount of publicity has been given to these drugs in U.S.A. and the basic merit, the requirements for satisfactory therapy and the dangers of indiscriminate use of these drugs have been lost sight of. Some ethical pharmaceutical firms resisted the " stampede " and, having received permission from the Food and Drug Administration to market their proprietaries over-the-counter, have elected to market them ethically on prescription only; other ethical pharmaceutical firms have formed subsidiary companies for the sole purpose of exploiting the field through non-ethical channels.

Some firms are reported to have offered the same antihistaminic drug under different names, one for sale on prescription only and the other for drug store sales. In most cases the dose of antihistaminic drug in the over-the-counter packs is 1/5th to ¼ that of the corresponding proprietary pack.

The drowsiness which is a common side-reaction of such antihistaminic drugs

The previous article appeared in THE CHEMICAL AGE, 62, 332.

varies according to the formulation and the susceptibility of the patient.

The tendency to promote drowsiness has admittedly been much reduced in the more recently introduced antihistaminics, but it appears not to have been entirely eliminated. The sales of these preparations direct to the public with dosages adjusted well below the therapeutic optimum further reduces the risks of mass self-medication.

In various proprietary presentations U.S. drugs have been compounded to counteract the drowsiness likely to be caused by antihistaminics employing amphetamine, caffeine and aminophylline, etc. These drugs, of course, carry their own inherent risks.

An increasingly popular polypharmaceutical is the combination of an antihistaminic drug with the well-established analgesic/antipyretic combination of aspirin, phenacetin and caffeine.

The medical profession in U.S.A. is strongly opposed in principle to "off-prescription" sales of drugs of this group. Against this is the practical issue that the drug must be administered most promptly and preferably within one hour of the onset of the symptoms of the cold for maximum effectiveness. The American medical profession stresses that the usefulness of the drugs has not been fully determined nor their ill-effects fully assessed.

The Food and Drug administration has been severely criticised for its apparent leniency in permitting the unrestricted direct sale of these drugs, but it appears to have done all it can within the law and the facts. Some restrictive legislation is considered not unlikely.

Allergic Asthma

In the United Kingdom, as elsewhere, various ethical proprietary brands of antihistaminic drugs have been available for many years and their principal field of usefulness has been in allergic reactions generally and especially in the treatment of allergic asthma. A demand for these existing products over recent months for cold remedies has been reported, but no attempt appears to have been made by manufacturers to exploit their reputed value as cold remedies by direct public advertising. U.K. manufacturers of antihistaminic drugs appear generally to have shown commendable caution in themselves seeking restriction by the authorities to ethical channels of distribution.

It is interesting to record in passing that, in recent weeks, a motorist has been fined and prohibited from driving for a period because of dangerous driving under the influence of an antihistaminic drug.

The use of these antihistaminic drugs poses not only problems of technical interest but touches the roots of ethicality, both in the practice of medicine and in the marketing of pharmaceutical products. It will be of interest to see at what point the conflicts are reconciled and observe the repercussions on the U.K. market.

Vitamin B_{12}

Considerable strides have been made during 1949 in the characterisation and chemistry of the antipernicious anæmia factor, Vitamin B_{12}, which was isolated simultaneously by E. Lester Smith at the Glaxo Laboratories in U.K. in 1948 and by a group of Merck workers led by Rickes in U.S.A. The drug was found remarkable for the minute dose, amounting to a few micrograms, which produces remissions in pernicious anæmia, sprue and nutritional microcytic anæmia. These conditions were previously treated first with massive oral doses of liver and latterly by injections of liver concentrates.

Lester Smith, who has been so closely concerned with these developments, has contributed a valuable paper, striking in its comprehensiveness, conciseness and modesty on the "Crystalline Anti-Pernicious Anæmia Factor" (*Brit. Med. J.*, 7/12/49, 1367) in which he offers a historical survey of the developments which led to the isolation and characterisation of Vitamin B_{12}.

Minot and Murphy first discovered the effectiveness of liver extract in pernicious anæmia in 1926, but progress was held up for two decades or so because the only means of assay was on clinical cases in which the technique is always tedious and time-consuming. Most of the assay work conducted in hospitals on clinical cases was of an unprecedented precision. The American workers, however, were able to develop a microbiological assay technique based on the fact that Vitamin B_{12} was an essential growth factor to *Lactobacillus lactis*, Dorner (Rickes et al., *Science*, 1948, *107*, 396; Shorb, *Science*, 1948, *107*, 397).

Numerous attempts were made to concentrate the anti-pernicious anæmia factor of liver during the decade following the basic discovery of Minot and Murphy. The methods used followed well-known biochemical procedures involving solvent extraction and precipitation with solvents and/or heavy metal salts, usually at a controlled pH.

In 1936 absorption techniques were brought into use and Strandell and Kelm were able to prepare fractions which were clinically active in doses of about a milligram (*Acta med. scand.*, 1936, *88*, 620).

Such concentration was an important advance, especially when it is remembered that there is less than 1 gram of the factor in 4 tons of fresh liver. In the paper referred to Lester Smith generously acknowledges that the work of Strandell and Klem formed the foundation of the subsequent work by himself and his colleagues.

Emery and his co-workers (*Brit. Med. J.*, 1945, i, 75, *Biochem. J.*, 1945, 40, iv) provided the next step in concentration, still using known techniques dependent upon adsorption on carbon, elution with phenol or hot 65 per cent alcohol and salting out with ammonium sulphate.

Chromatography Techniques

Lester Smith and his colleagues achieved the next advance by exploring the use of newly elaborated partition chromatography techniques with concentrates first provided by the classical methods of concentration. Strikingly, the factor appeared to be concentrated in one pink band and this afforded a great advantage in isolation . These workers subsequently passed through a phase of discouragement in which a factor was the discovery of folic acid (dealt with fully in previous reviews) which, at first seemed to be the anti-pernicious anæmia factor. Later investigations, however, showed this was not so, and in particular, that folic acid failed to prevent the sub-acute combined degeneration of the spinal cord, which ultimately leads to a fatal outcome in pernicious anæmia.

As the chromatographic technique was improved it was realised that still further concentration would have to be achieved in order to crystallise the factor. This was secured by the adoption of a proteolytic enzyme digestion with trypsin, or the like, to break down peptide impurities. Further chromatography after enzymic digestion eventually led to the crystallisation of Vitamin B_{12} from acetone.

The factor appeared in the form of bright red needles which appeared almost black in bulk. The absorption spectrum in aqueous solution shows three well marked absorption bands at 278 mμ and 361 mμ and 550 mμ. Lester Smith, in his paper, stresses that the technique used for the isolation of the factor was almost entirely physical and this was necessary because the factor was " singularly devoid of characteristic chemical properties."

The isolation of the anti-pernicious anæmia factor, combined with elaboration of microbiological assay techniques, has afforded the opportunity of standardising liver extracts and concentrates in terms of Vitamin B_{12} activity which, in itself, is a great advance.

Simultaneously, Ungley, of the Royal Victoria Infirmary, Newcastle-upon-Tyne, with statistical assistance from Campbell, began the long and elaborate series of 84 clinical tests with various of the Glaxo isolates on patients with pernicious anæmia in relapse (*Brit. Med. J .*, 17/12/49, 1370).

Conclusions were arrived at on the basis of a number of responses at each dosage level 1.25—160 μg) the response being measured mainly by the increase in red blood cells. In 32 cases the amount of vitamin B_{12} required to give satisfactory red blood cell counts and remission varied between 15 to 140 μg, and the time required was 15 to 118 days. It was found that it was economical to administer a given amount of the factor in divided doses at fortnightly intervals rather than in a single large dose.

Ungley found that within the first few days of the treatment patients showed a dramatic response including an increase in appetite and well-being and, later, a gain in weight. There appeared to be no unpleasant side-effects and sensitiveness to the drug was not encountered.

Maintenance Requirements

It is too early to be clear what are the maintenance requirements and, indeed, such information as exists seems to indicate that patients show great variability in this requirement.

So long as the supply of vitamin B_{12} is dependent upon the use of liver as a raw material its production is likely to be hampered for obvious reasons. It is, therefore, encouraging that, arising from work on the " animal protein factor " required by chicks reared on a vegetable-protein diet, it appeared that the essential factor was synthesised by intestinal bacteria and, consequently, thought was turned to the possibility of preparing the factor by a microbiological process.

(*To be continued*)

Aureomycin as Growth Stimulant

THE claim that aureomycin, hitherto known for its anti-infection properties, is also a potent growth promoting substance was recently made by the American Chemical Society.

The report of two research chemists, Dr. E. L. R. Stokstad and Dr. T. H. Jukes, both of the American Cyanamid Company, states that 5 lb. of an unpurified substance on which the aureomycin fungus grows, when mixed with 1 ton of animal feed, increased the rate of growth of hogs by as much as 50 per cent.

Tests are being carried out to determine whether the drug is equally effective in stimulating the growth of children.

OVERSEAS CHEMISTRY AND INDUSTRY

GROWING OUTPUT IN BRAZIL

Industrial Acids and Fertilisers and Sodium Chemicals

THE rate of growth of Brazilian chemical industries is indicated by the widening variety and bulk of industrial acids coming from home plants, enlarged last year by the inauguration of two new factories producing sulphuric acid and explosives.

Although U.S. sulphur remains the essential for much of the national sulphuric acid production—writes our correspondent in Teresopolis (Rio)—some production is now employing local pyrites and process waste gases. Current investigation aims to provide means of benefitiating pyrites in the coal fields in the interest of fuller production of sulphuric acid.

Abundant raw materials for fertilisers exist and are being increasingly exploited by private enterprise and the Ministry of Agriculture. Apatite occurs in limestone deposits in four States, the reserves in Minas Geraes, alone, being estimated at 100 million tons. In Maranham, in the north, experiments are being carried out to produce phosphoric acid and soluble prosphates in electric furnaces from phosphoric bauxite.

During 1950 the Department of Mineral Production will investigate the prospects of recovering potassium salts as a subproduct of the salt mines, and the concentration of nepheline and leucite for subsequent extraction of potassium salts. Lime is found in all but two Brazilian States, and deposits of nitrate have recently been registered by the State Museum in Goiás. The nitrate is reported to be of excellent quality, but no information is yet available regarding the extent of the reserves.

Considerable advance was made last year in the manufacture of chemical fertilisers. Several firms increased their output and two new companies were organised to prepare phosphates and potassium.

Caustic Soda Development

Towards the end of 1948, under the auspices of the Council of Mines and Metallurgy, three Brazilian companies concluded an agreement for the joint exploitation of the industry of caustic soda and derived products. The companies were: Industrias Brasileiras Alcalinas S.A. (IBASA), Companhia Salgema, Soda Caustica e Produtos Quimico (Salgema). and the Companhia Nacional le Alcalis (Alcalis).

IBASA is a subsidiary of Losanac, Montreal, and of the Solvay American Corporation, affiliated to Duperial. Salgema was formed in 1941 by the administrator of properties taken over by the Federal Government.

Alcalis was founded in 1943 by the Federal Government with a capital of 50 million cruzeiros (£950,000 present exchange), of which 26 million were subscribed by the Government National Sal: Institute.

Long-Term Project

Under the 1948 agreement IBASA is authorised to exploit for 80 years the rock salt deposits at Contiguibá, in Sergipe, which belongs to Salgema, giving loans to the latter as compensation. Alcalis participates indirectly in the agreement and may exploit the deposits situated outside the zone reserved to IBASA.

During 1949 Alcalis completed its preliminary studies and plans for Brazil's first factory to produce caustic soda and barilla (impure soda ash).

A factory is to be built at Cabo Frio, on the coast, 60 miles north of Rio de Janeiro, to produce annually 100,000 tons of carbonate of soda, which will furnish 45,000 tons of caustic soda, 33,000 tons of barilla and other products. About 60,000 tons of caustic soda are now imported annually, but domestic consumption is increasing rapidly.

Salt will be obtained industrially by means of evaporators, employing salt water concentrated to 10 Bé in a pan occupying an area of 100 acres, and afterwards to 25 Bé in one with an evaporating surface of 2.4 million sq. yd.

Lime will be obtained from shells, dredged from the adjoining lake, washed on the dredgers and conveyed by lighter directly to the silos or the furnace mouth. The shells have a carbonate content of 95.40 per cent and reserves are calculated to be 15 million tons. Imported oil will be used as fuel until the national refineries, now building or about to be built, begin to produce.

The company has increased its capital from 50 to 100 million cruzeiros (£1.9 million), and is now waiting to sign the contract for a loan, already approved, from the Export and Import Bank of Washington, for U.S. $7.5 million. This sum will be used to finance imports of machinery and to pay technical staff.

South African Chemical Enterprise

Production of Cyanide From Local Materials

From Our CAPE TOWN CORRESPONDENT

ONE-THIRD of the cyanide used by the gold mines is now being completely produced in South Africa. It is made in the Klipspruit factory of African Explosives and Chemical Industries from locally obtained materials. A feature of this plant is that it uses by-products—in particular methane—of the Klipspruit sewage disposal works that would otherwise go to waste. As a result, 12 mines are being supplied with cyanide essential for their production of gold.

The cyanide leaves the factory in road tankers in solution, as being a convenient form for use in the mines plant, and is delivered into storage tanks constructed at the mines at the expense of the explosives company. The particular product of this factory is calcium cyanide, which has been shown by tests to be as suitable for the mines requirements as the sodium cyanide previously marketed. Some of the mines use " black " cyanide, which is processed in South Africa from imported intermediate materials, but the Klipspruit factory is the first in the Union to make cyanide entirely from local materials.

* * *

A new type of machine for spraying a fog of insecticide for the purpose of killing ticks on cattle is shortly to be put into use in northern Rhodesia. This is claimed to eliminate the need for dipping and to be much more effective. Big advantages are that it can deal with a large group of animals at one time, is easily transportable, and depends only on water supplies. Exhaustive tests have been carried out at the Central Research Station at Mazabuka, with favourable results.

* * *

The S.A. Federated Chamber of Industries will probably urge that the Klipfontein Organic Products Corporation Bill, which has been read for the first time in the House of Assembly, be referred to a select committee before the second reading. The Bill proposes to transfer the State-owned DDT factory near Johannesburg to a public utility corporation, which will manufacture insecticides, and a wide range of agricultural chemical products.

The corporation will have a share capital of £3 million made up of £2 million in ordinary £1 shares to be held by the Government and 1 million ordinary £1 shares to be held by private manufacturers who have established factories on ground owned by the corporation. The Klipfontein factory was built during the war by the British and South African Governments to make poison gas. Later the Union Government took over the British Government's share of the assets, and since the war the factory has been making chiefly DDT concentrates and compounds for general sale.

* * *

In addition to its large enterprise at Saldanha Bay, the Vrany Chemical Corporation of S.A., has begun the commercial production of high-grade salt at Coega, some 17 miles from Port Elizabeth. A relatively inexpensive system of draining the brine in the dry basin at Coega has been evolved. The brine is pumped to the surface and run into large pans. When it is sufficiently concentrated, it crystallises into the salt deposits which are marketed in conformity with the specifications of the S.A. Bureau of Standards. The company has a laboratory at the site and its own electricity power station.

West German Steel

THE production of crude steel by the British zone of Germany reached its highest monthly level in January—907,109 tons. (The previous highest output—844,921 tons—was recorded in August, 1949). The January figure represents an annual rate of 10,850,000 tons; 11.1 million tons is the maximum permitted by the Prohibited and Limited Industries Agreement.

German authorities are reported to be in some doubt as to whether this rate of production can be justified or continued, as the total order book for hot rolled products at January 1—including some 15 per cent of orders for deferred delivery—represented an average of only two or three months' work at this production rate.

No provision has yet been made for implementing the 11.1 million tons restriction, but the Iron and Steel Department of the German Ministry of Economics is preparing a scheme to do this, which will probably require production quotas to be set for each producing unit.

U.K. REFRACTORIES

American Expert's Views

"THE British are doing a creditable job in spite of governmental obstruction, and the scarcity and high prices of raw materials, which are in many cases of inferior quality."

That estimation of the situation of the U.K. ceramic industry was offered by Mr. William S. Debenham, research associate, Research and Development Division, Carnegie-Illinois Steel Company, in the course of a talk to the Pittsburgh Section of the American Ceramic Society.

A year or so ago, Mr. Debenham visited many steel mills in England and Scotland, states *Ceramic Forum*. His principal interest lay in the quality and performance of the refractories used in building blast and openhearth furnaces.

Ceramic research enjoyed Government assistance and considerable work was being carried out in the field of refractories.

The speaker considered the "class system" had practically gone but the idea of small production of quality goods at a high profit persisted. Much of the equipment was obsolescent (no central heating and no private baths). The government bore heavily on the business man; many of the shortages and poor quality of raw materials, in his view, were due to Government controls.

Silica Refractories

Mr. Debenham discussed in detail the manufacture, setting and performance of silica refractories. British steel men were sceptical of low Al_2O_3 in silica brick. Although there appeared to be no correlation with service records, specific gravity was tested rigorously. On to the subject of high Al_2O_3 fire-clay brick he considered most of the clays were poor in quality.

Basic refractories were widely made and used. Because of the shortage of magnesite, dolomite was the raw material most generally used, and in some quarters it was considered to be superior to magnesite. Much fine research work had been done on basic refractories such as spinel and chrome-magnesite. Mr. Debenham specially noted the very modern carbon refractories which are to be used in two projected furnaces in England.

The speaker covered in detail the manufacture of refractory shapes, commenting on the general slowness and small output of operations and, according to American standards, poor firing. The masonry work, however, he considered to be very carefully done, the settings being more precise than in the U.S.A.

GERMAN RECOVERY

Chemical Company's Record

WHAT appears to be an outstanding example of rapid post-war recovery by a German chemical undertaking is recorded in the report commemorating the 85th anniversary of the Badische Anilin und Sodafabrik (BASF) of Ludwigshafen-Oppau (French zone).

The most remarkable single point emerging from this account is that the firm has almost re-established its pre-war export business. Formerly about 40 per cent by value of the total output was shipped abroad; now this percentage has reached almost 30 per cent. Bearing in mind the strong position of the U.S., U.K. and Swiss chemical concerns in world markets, this is a considerable achievement.

Export Recovery

The re-entry of Badische into the export field is even more remarkable because it has been achieved without having at its disposal a foreign sales organisation or agencies abroad. It is stated that this favourable result is due to the incessant work of German business men and technical experts who have visited and advised foreign customers.

The firm considers it particularly gratifying that many customers, said to have been disappointed with products marketed by competitors using confiscated trade marks of Badische have resumed connections with the Ludwigshafen firm. Since the end of the war, about 500 new patents have been registered, but on account of the post-war patent law position, the majority of these were registered in France.

The management expresses its confidence in the future and believes that the firm will maintain its old markets and also enter new ones. In spite of the considerable post-war difficulties connected with clearing up, dismantling and a large-scale explosion, no workers have been dismissed. The firm paid salaries last year amounting to RM 86 million, and no less than RM 12 million in pensions to over 10,000 former employees.

Badische, originally a unit of the former I.G. Farbenindustrie, in 1945 became an independent unit and resumed its former title. Managerial functions and administration are in the hands of the French sequestrator with a staff of some 300 officials and specialists. Reconstruction work following war damage is estimated to cost RM 400 million.

ISRAEL'S POTASH PLANS

State Demands to Concessionaires

THE uncertainty whether exploitation of Israel's potash deposits would be profitable was expressed recently by Mr. D. Z. Pinkas, chairman of the Finance Committee, to the Israeli Parliament.

Palestine Potash had operated at a loss for years, he alleged, because a French-German cartel had undersold it and prices were still controlled by an international cartel.

The Palestine Potash Co., Ltd., he said, had received its concession on January 1, 1930, from the British High Commissioner, representing the governments of Palestine and Trans-Jordan. The company had hoped to raise £1 million. He claimed it had not succeeded in reaching that total.

Production and Profits

Its equipment was primitive, Mr. Pinkas said, and the maximum output was 250,000 tons a year; between 1940 and 1947 profits exceeded £1.5 million. Under the terms of the concession, the governments of Palestine and Trans-Jordan received a five per cent *ad valorem* duty and 40 per cent of the profits before payment of dividends.

The Finance Committee, Mr. Pinkas said, had approved a loan of $2.5 million from the American Export-Import Bank to the concessionaires, on condition that by the end of 1950 the company's registered office be moved from London to Israel, and the chairman and the majority of directors should reside in Israel. The majority of the voting shares should be Jewish owned.

The company must undertake to raise £2 million in foreign exchange for the expansion of the southern end of the Dead Sea works, and for the housing of workers. Fresh water for the desalting of the pans should also be provided by the company.

The Finance Committee had also recommended that the company should agree not to resume operations at the northern end of the Dead Sea (now in Jordan hands).

Trans-Jordan should not put up a rival plant.

The trend towards nationalisation of the Dead Sea potash industry is called to mind by the committee's recommendation that the Palestine Potash Company should be required to agree to negotiate with the Government, on one year's notice, if the latter decided to take over the works.

INDIA'S SURPLUS SOAP

High Costs and Few Markets

THE opinion that insufficient efforts have been made by the Government of India to develop the country's export market for soaps in demand overseas was expressed recently at the 16th annual conference of the All India Soap-makers' Association in Madras.

High production costs, caused largely by the increased prices of raw materials, had made it impossible for Indian soaps to compete successfully with their foreign counterparts, the association maintained, and added that these costs could be substantially reduced if, in pursuance of the policy already adopted by the Government, the high import duty on palm and other vegetable oils could be lowered.

The recommendation was made that the Government, when concluding bilateral trade agreements, should make clear provision for the export of soaps to the contracting countries and explore ways by which the Trade Commissioners' organisations could best serve the export interests.

Mr. P. B. Kurup said that in 1948 the industry produced 180,000 tons, against the installed capacity of 225,000 tons. Indigenous consumption was found to be only 125,000 tons, leaving an exportable surplus of 55,000 tons.

Today, India was faced with the problems of mounting production, stock accumulation, and decreasing purchasing power.

Plans for Fine Chemicals

THE fine chemicals industry could be firmly established in India if its production was properly planned and its branches were developed under rigid control of production costs and of quality. That was the suggestion made by Mr. G. L. Mehta, president of the Tariff Board, in the course of his opening remarks during an inquiry in Bombay into a claim for protection or assistance of the fine chemicals industry.

The inquiry was mainly concerned with four chemicals; calcium lactate, iron-ammonium citrate, potassium citrate, and sodium citrate.

Production of these chemicals by the process of fermentation of molasses or citrus juice, of which there was abundant supply in the country, said Mr. Mehta, could form a nucleus for the production of various other organic compounds, such as butyl alcohol, acetone, acetic acid, ethyl acetate and other products.

Technical Publications

EFFECTIVE use of polythene to procure lightness with adequate strength in construction of storage batteries is seen in the new Exide battery designed by Chloride Batteries, Ltd., London. This 24 volt unit (type 12-ZCII) weighs only 43½ lb. complete with acid, and has a capacity of 25 amp.-hours. The container is a one piece 12 compartment monobloc moulding of polythene, which is unaffected by sulphuric acid, oil or petrol and will withstand extremes of low or high temperatures.

* * *

COLLECTION of grit and dust in light industries is in some respects a more complex problems than in boiler plants, in which higher costs are justified. A low resistance dust collector, easily fitted to small boiler plants with steel chimneys, is described by Prat-Daniel (Stanmore), Ltd., in its latest catalogue (No. P.21). The equipment is said not to entail heavy capital outlay to install and is simple to maintain.

* * *

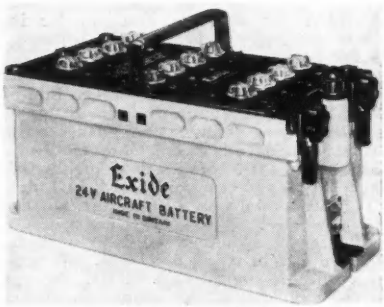
"THE Acceleration of Particles to High Energies" is the title of the latest addition to the Physics in Industry series of publications issued by the Institute of Physics. The new work, with a foreword by Professor M. E. Oliphant and an editorial by H. R. Lang, the Institute's secretary, is based on a session arranged by the Electronics Group at the Institute of Physics Convention held in May last year.

* * *

IN processes involving filtration, diffusion or the use of porous electrolytic diaphragms, the pore size and permeability of the porous medium are two of the critical factors. These properties, practical aspects and flow curves are studied in detail by Doulton & Co., Ltd., London, in its latest reprint catalogue of porous ceramic media and accessories (Section No. 10). This is one of a series covering the company's standard range of products in chemical and general stoneware, laboratory and technical porcelain, and ceramic insulating materials.

* * *

DESERVING to be preserved by chemical engineers because of the detailed information of physical and mechanical properties of K-Monel is the latest booklet published by Henry Wiggin & Co., Ltd., Birmingham. This precipitation-hardening nickel-copper alloy is stated to have the the corrosion-resistance of Monel and mechanical properties equal or superior to those of heat-treated alloy steels. Results are given, taken at normal and elevated temperatures, covering compression, shear, fatigue, tensile and impact strengths.



[Courtesy, Chloride Batteries, Ltd.

Representing a newer use of polythene for strength and lightness in battery construction

* * *

CENTRIFUGAL and other types of pumps, dust extraction plant, and furnaces are among the new and reconditioned plant described in "Plant" (Vol. 1, No. 4) now available from Chamberlain Industries, Ltd., Leyton, London.

Mobile Lighting Display

OPPORTUNITIES to study the effects of a great variety of forms of industrial lighting fitments without the necessity of visiting a showroom, possibly remote, are provided by a new mobile showroom introduced by Crompton Parkinson, Ltd.

By skilful planning, more than 30 different types of fittings can be displayed, while a variety of reflectors for industrial lighting, either by fluorescent or filament lamps, is available for inspection.

Different voltage supplies are provided for by a Variac transformer control which can be connected to any electricity supply from 200 to 250 a.c. volts to give an output of 230 volts.

INDUSTRIAL SAFETY GLOVES

New PVC and Rubber Standards

A NEW standard specification, for industrial safety gloves, which is shortly to be issued by the British Standards Institution, has been prepared under the supervision of the Personal Safety Equipment Standards Committee consisting of representatives from, among others, the British Chemical Plant Manufacturers' Association, the Association of British Chemical Manufacturers, and I.C.I., Ltd.

It is stipulated that PVC gloves, mittens and one-finger mittens shall consist of a uniformly compounded polyvinyl-chloride mix made from virgin materials, deposited on a suitably-shaped base fabric. Except on the cuff and at the seams, the gloves shall have a uniform thickness of not less than 1.5 mm. and not more than 1.8 mm. On the cuff the thickness shall not be less than 1.3 mm. A method of micrometer determination of the thickness is specified.

To ensure maximum abrasive resistance in so far as the rough type is concerned, and maximum impermeability to dangerous acids and chemicals where the smooth type is concerned, penetration of the resin into the base fabric during moulding shall be approximately 33⅓ per cent.

For air-pressure test, the polyvinyl-chloride glove is to be plugged at the wrist by means of a suitable plug fitted with an inlet tube to permit the entry of air under low pressure. The glove shall then be immersed in water with the fingers downwards, so that the water level corresponds to the position of the plug in the wrist and any adherent air bubbles removed by gentle brushing. Air under a gauge pressure of 20 lb./sq. in. shall be introduced into the glove, which shall be maintained in this condition for one minute. The surface of the glove shall then be examined for the presence of air bubbles.

The accelerated ageing test laid down for rubber gloves is that test specimens, prepared as described in B.S. 903 ("Methods of Test for Vulcanised Rubber") shall be freely suspended in a thermostatically controlled air oven. The specimens shall be kept in the oven for a period of 168 hours at a temperature of 70 ± 1° C., provision being made for a slow circulation of air though the oven during this period. After removal from the oven the specimens shall be kept at a temperature of 65-75° F. (18-24° C.) for a period of 24 hours. They are then subjected to the tensile tests also described in B.S. 903.

DEFINITION OF RAYON

Not a Generic Term

FOLLOWING discussions which have been taking place recently regarding the use of the term "rayon" and of the need for a generic term for man-made fibres, the Textile Institute has reviewed the position, and reports that, at a meeting of the textile section of the International Standards Organisation at Buxton in 1948, it became clear that the weight of world opinion was against the adoption of the word "rayon" as a generic term embracing all man-made fibres. The British delegates themselves were unable to present a united front and for this reason they abstained from voting on the question. The textile terms and definitions committee, at its meeting on January 19, recommended that the published definition should be withdrawn. This recommendation was approved. At a meeting on March 14, the following tentative definition of the term was approved: "*Rayon*, noun (or adjective),—regenerated fibre wholly or mainly of cellulose origin." This term includes viscose, cuprammonium, acetate, and other cellulose ester and ether fibres.

Mixed-Bed Water Treatment

PRODUCTION of small quantities of extremely high purity water is of increasing importance to chemical industries.

Eight years ago the Permutit Co., Ltd., London, introduced a new technique in water treatment employing mixed cation and anion exchange materials for producing high quality demineralised water in a single step.

Adapted to peacetime requirements, this method can produce water with an electrical resistance of over 10 million ohms per cu. cm.

The ion exchange materials employed in this mixed bed deionisation technique are Zeo-Karb 315 and the newly developed highly basic anion exchanger De-Acidite F.

When a mixed bed is used for treatment of water which has been previously distilled or demineralised by a normal technique, the effluent from it is of a quality previously unobtainable without multiple distillation and is suitable for use as conductivity water and in trace element work.

Deionisation takes place in neutral solution, so that acid-sensitive solutions can be treated.

HOME

Works Extending

Plans have been approved for the extension of the works of the Cornbrook Chemical Co., Ltd., at Newbridge Lane, Stockport, Cheshire.

Water Pollution in Scotland

Industrial effluent is alleged to be responsible for one quarter of the water pollution in the Border area in Scotland, according to statements at a conference held recently at Newton St. Boswells to decide on a policy for purification. Arrangements to improve domestic sewage are reported to be already in hand, and further action by industrial concerns is now thought to be essential.

Whale Oil Arrivals at Liverpool

First of the great whale factory fleet to reach Liverpool is the 19,000-ton Norwegian factory ship *Kosmos V*. She arrived with a full cargo of whale oil, of which 8350 tons was discharged into lighters which conveyed the oil to Bromborough. Whale oil is arriving in the Mersey in such great quantities that storage is becoming [illegible] and, for the first time since Antarctic whale hunting reopened after the war, two ships have had to be diverted to London.

Textile Institute's Appeal

The rapid extension in the activities of the Textile Institute since the end of the war has placed a heavy strain on its financial resources. To enable it to maintain its work, the institute has issued an appeal for financial assistance to over 5000 textile firms throughout the country. In 1948 it incurred a deficit of £4318, and in 1949 a further deficit of £5206. It has already awarded seven £750 scholarships and one open £1000 scholarship to young craftsmen and students, as well as many smaller awards.

Annual Meeting of Textile Institute

The Textile Institute is to hold its 40th annual meeting at the Grand Hotel, Leicester, on May 10. Prior to the meeting, the Lord Mayor of Leicester will extend a civic welcome to members. The meeting will be followed by the Mather Lecture, to be given by Mr. F. Scholefield (head of the department of textile chemistry, College of Technology, Manchester) whose theme will be "Sir William Mather—his contribution to the Textile Industry." Members of the institute will tour several Leicester textile works during the morning.

Coal Production Lower

Output of coal last week was 3,135,400 tons (2,959,100 deep-mined; 176,300 open-cast) compared with 3,965,500 tons (3,722,400 deep-mined; 243,100 open-cast) the previous week, and 3,918,100 tons for the corresponding week of last year.

Another U.S. Industry for Scotland?

Ranco, Inc., of Cleveland, U.S.A., manufacturers of thermostats and electrical instruments, is reported to be considering the location of a British factory in one of the Scottish industrial estates. There are already 18 American and Canadian firms operating in Scotland.

Pollution of the Atmosphere

Complaints of smoke nuisance, alleged to have been caused by the penicillin factory, Speke, have been reported to the Whiston Rural District Council by the chief sanitary inspector. The committee resolved to contact the smoke inspector, Liverpool, to remedy the position.

BISOL Dibutyl Phthalate

British Industrial Solvents, Ltd., announces a reduction by ½d. per lb. in the price of dibutyl phthalate with effect from April 11. This applies to contract as well as spot purchases. Some revised prices are: 10 tons, 1s. 9½d. lb.; 1-5 tons, 1s. 10d. lb.; less than one ton, 1s. 10¾d. lb.; deliveries in 10-gallon cans 2s. lb.

Few Science Graduates

The report of Oxford University Appointments Committee for 1949 draws attention to the fact that during last year only 15 men from Oxford took school appointments in mathematics, physics, and chemistry, and there were no biologists. Low salaries are being paid in the teaching profession, says the report, and graduates are naturally turning more to posts in commerce, industry and the Government scientific service.

Board of Trade Department's Move

The Administration of Enemy Property Department of the Board of Trade removed on April 17 to Lacon House, Theobalds Road, London, W.C.1. (Telephone, Chancery 4411). Among the other parts of the Board of Trade which will be moving into Lacon House over the next three months are the Nitrogen Directorate, Paper Control (Newsprint), Leather Control, Technical Information & Documents Unit and the Exhibitions branch.

· PERSONAL ·

THE Lord President of the Council has appointed PROFESSOR SIR IAN HEILBRON, D.S.O., F.R.S., to be chairman of the Advisory Council for Scientific and Industrial Research in the place of Sir Geoffrey Heyworth, who resigned owing to pressure of other public duties. Sir Ian Heilbron is now director of research of the Brewing Industry Research Foundation near Redhill, Surrey, and Emeritus Professor of London University.

DR. H. W. B. SKINNER, who succeeded Klaus Emil Julius Fuchs as head of the theoretical physics division at the Atomic Energy Research Establishment, Harwell, Berks., has left to occupy the Lyons Chair of Physics at Liverpool University.

DR. J. BRONOWSKI, assistant chief scientific adviser at the Ministry of Works, has been appointed director from May 22 of the National Coal Board central research establishment, Stoke Orchard, near Cheltenham. Dr. Bronowski, who is 42 and a mathematician, is known as a broadcaster on scientific subjects.

The council of the Textile Institute is nominating MR. GEORGE SPENCER, of Winwick Manor, West Haddon, near Rugby, as president of the Institute in succession to Mr. J. Foster Beaver, who has completed two years in office. The new president is chairman of several textile and dyeing and finishing companies.

PROFESSOR W. J. DILLING, professor of pharmacology in the University of Liverpool, has resigned, owing to ill-health, from the Council of the Pharmaceutical Society of Great Britain, on which he has served since 1938.

LORD LUCAS OF CHILWORTH, Parliamentary Secretary to the Ministry of Transport, will be the guest of honour at the annual dinner of the Traders' Road Transport Association, national organisation for "C" licence-operators, in London, on April 25, at which the president, COL. A. JERRETT, will preside.

MR. EDMUND SPYET, of Brantridge Forest, Balcombe, Sussex, formerly a director of Murex Welding Processes, Ltd., Clover Paint and Composition Co., Ltd., and Murex, Ltd., left £362,115, £357,269 net.

PROF. ALBERT PORTEVIN, to whom the Institute of Metals recently awarded its platinum medal (THE CHEMICAL AGE, 62, 516), is renowned for his contributions to the science of physical metallurgy, particularly of steels. The professor, it is recalled in a current note from the institute, has particularly studied the process of fusion and solidification and of transformations in the solid state. He extended Tammann's method of thermal analysis to ternary systems, and, with Prof. Chevenard, perfected methods of dilatometric analysis. With M. Castro, he carried out important studies of the non-metallic inclusions and of the determination of oxygen in steels, and developed micrographic methods for the study of non-ferrous alloys, comparable with those used for steels. His work on the transformation of steel and on the light alloys of aluminium has been extensive.

BA Chemistry Programme

THE British Association will hold its annual meeting this year in Birmingham, from August 30 to September 6. First programme details indicate the themes of the chemistry section (B) of which the proceedings will be opened by the section president, Professor E. L. Hirst, on August 31 with the paper "Modern Developments in Carbohydrate Chemistry." The subsequent discussions planned are these: September 1, "Chemistry of Plastics, Rubber and Fibres"; September 1, "Chemistry of the Cell, with special reference to the Nucleus"; (Sections B and K); September 4, "Chromatography"; September 5, "Harnessing Chemical Energy"; September 6, "Chemistry of Muscular Contraction" (Sections B and I).

OBITUARY

DR. FREDERICK THOMAS PEIRCE, an outstanding textile physicist, who was for 24 years engaged in research at the Shirley Institute of the British Cotton Industry Research Association, Didsbury, Manchester, has died in Sydney, Australia.

MR. JOSEPH SYKES, a director of Reads of Liverpool, has died in his eightieth year. He had 49 years' service with the group, having joined Reads, Ltd., in 1904 as factory manager at its Bridgwater Street (Liverpool) works.

OVERSEAS

Yugoslavia to make Duralumin

The Lozovao (Jugoslavia) Aluminium Works is reported to have completed preliminary work in connection with the manufacture of duralumin; output is expected to start on a regular basis fairly soon.

Rumanian Mining and Metallurgical Trust

The first mining and metallurgical trust has recently started operations in the Baia Mare district of Transylvania (Rumania). It integrates the Phoenix Chemical Works, the Ferentiu Chemical and Metallurgical Works, as well as all gold, siver, lead, zinc and copper mines located in the Baia Mare, Satu-Mare and Maranures districts.

Indian Penicillin and Sulpha Drugs

An agreement has been signed recently between the Government of India and the Swedish firm, Karnbolegat, Stockholm, for the manufacture of penicillin and sulpha drugs in India, The proposed factory in Bombay is estimated to cost Rs.3.5 crores and may be completed by the end of the financial year 1951-52.

Swiss Nylon

Viscose S.A., Emmenbrücke, Switzerland, a company which belongs to the French Rhodiaceta group, has decided to make a partial conversion of its manufacturing programme to the production of nylon is justified. The firm possesses a U.S. licence and the required machinery and equipment will be imported from the U.S.A.

French Petroleum Chemicals

The Société Naphachimie's petroleum chemicals plant, in course of construction near Etang de Berre, has a planned throughput of 52,000 metric tons of crude oil annually. It will produce a variety of chemical products, including glycols, solvents (21,000 tons of spirit having a high octane content) and 28,000 tons of 50° Bé washing soda.

Hebrew University's Anniversary

Messages of congratulation to the Hebrew University on its 25th anniversary were conveyed from Britain by Dr. F. A. Freeth, of I.C.I., Ltd. One message, in an embossed leather cover, was from the Royal Society and was signed by Sir Robert Robinson. The others were from Liverpool University and the Institution of Chemical Engineers. Dr. Freeth, who spent three weeks touring Israel, was the guest of the Hebrew University for four days.

Algae Industry for Morocco

A company has been formed in Morocco to treat the algae found near Safi. It is expected that 100 tons a day will be gathered by the company, which has equipped a factory for the extraction of iodine salts and other derivatives.

Poland to Make Lactose

The first Polish penicillin works, established at Tarchomlin, near Warsaw, which has so far relied on imported lactose, is constructing in Lower Silesia a large works which, when completed, is expected to supply a large part of the growing lactose requirements.

Calcutta's First Cyclotron

A cyclotron has been installed in the Nuclear Physics Institute, Calcutta University and Indian students have been sent abroad for training in handling the machine, announced Pandit Nehru, the Prime Minister, in the Indian Parliament, last week.

Chinese Chemical Industry

Expansion of China's chemical industry is to be confined this year to the North-Eastern part of the country. Current reports state that priority is to be given to the production of fertilisers, dyes and cement. Government investments are to be directed chiefly into fertiliser manufacture and centralisation is to be encouraged.

Dutch Penicillin Progress

Penicillin output by the Yeast and Spirit Co. (Nederlandsche Gist en Spiritusfabriek, Delft) is reported to be steadily increasing. Dutch use of the drug has been much encouraged by recent price reductions made by the company. At the end of 1949 a variant, "depocillin," was marketed, described as a form of penicillin which has a delaying effect.

Radioisotopes for Cancer Research

The cancer research centre, which will carry out experiments with perishable radioisotopes, was established this month near Oak Ridge, Tennessee. Children suffering from leukemia (cancer of the white blood cells) will be among the first to be admitted to the hospital. The research programme will be financed by public funds and directed by the Oak Ridge Institute of Nuclear Studies. Cancer research will also be conducted by the U.S. Atomic Energy Commission at the Argonne National Laboratory at Chicago, and the Brookhaven National Laboratory, Long Island.

Next Week's Events

MONDAY, APRIL 24

Society of Chemical Industry

London: Royal Institution, Albemarle Street, W.1, 6 p.m. Dr. L. H. Lampitt: "Towards International Collaboration in Science."

The Royal Institute of Chemistry

Gillingham: Medway Technical College, Gardiner Street, 7.30 p.m. Dr. N. Booth: "Careers for Chemists."

Oil and Colour Chemists' Association

Hull: Royal Station Hotel, 6.30 p.m. AGM, followed by film: "The Scientific Manufacture of Printing Ink."

TUESDAY, APRIL 25

The Chemical Engineering Group (SCI)

London: Burlington House, Piccadilly, W.1, 5.30 p.m. M. M. Hallett: "Corrosion Resisting Cast Alloys Containing Nickel, Chromium and Molybdenum."

The British Ceramic Society

Stoke-on-Trent: Jubilee celebrations convention (and at Buxton). April 25-27. Papers, works visits, dinner, etc.

The Institute of Physics

Newcastle-upon-Tyne: King's College, 7 p.m. Dr. L. A. Sayce: "The Light Division of the National Physical Laboratory."

WEDNESDAY, APRIL 26

The Chemical Society

Portsmouth: Municipal College, 7 p.m. (with RIC and Portsmouth Chemical Society). Dr. W. A. Roach: "Trace Elements in Plant Life."

Society of Chemical Industry (Food Group)

London: Burlington House, Piccadilly, W.1, 6 p.m. Nutrition Panel AGM. 6.15 p.m. Dr. F. Wokes: "The Nutritional Significance of Vegetarianism."

Eastbourne: Pavilion, Winter Garden, Devonshire Park, 10 a.m. Joint meeting with Royal Sanitary Institute. Discussion: "Hygiene and Food Manufacture."

British Association of Chemists

Birmingham: University, Edmund Street, 6.30 p.m. G. E. Smith: "The Production of Essential Oils and their Uses in Industry."

Manchester Literary and Philosophical Society (Chemical Section)

Manchester: Portico Library, Mosley Street, 5.45 p.m. Dr. H. Gudgeon: "Some Aspects of Industrial Chemical Research."

The Institute of Fuel

London: Storey's Gate, St. James's Park, S.W.1, 5.30 p.m. (open to public). E. Bonwitt and H. E. Charlton: "The Fuel, Heat and Power Aspects of the Petroleum Chemicals Plant for Petrochemicals, Ltd., Partington."

THURSDAY, APRIL 27

The Chemical Society

Sheffield: University, 5.30 p.m. Tilden Lecture. Prof. F. S. Spring: "Recent Advances in the Chemistry of the Steroids."

Incorporated Plant Engineers

Sheffield: Grand Hotel, 7.30 p.m. "Costing for the Plant Engineer."

Society of Chemical Industry (Agriculture Group)

London: Royal Institution, Albemarle Street, W.1, 6 p.m. Inaugural meeting of the Crop Protection Panel. Dr. H. Martin: "Advances in Chemical Methods of Crop Protection."

FRIDAY, APRIL 28

Royal Institute of Chemistry

Stockton-on-Tees: William Newton School, Norton, 7.30 p.m. AGM. Dr. H. J. T. Ellingham: "Recent Developments in the Work of the Institute."

The Institute of Physics

London: 47 Belgrave Square, S.W.1, 5.30 p.m. Dr. P. Coheur: "Direct Spectrochemical Analysis."

Development of Electronics

SOME idea of the wide field served by modern electronics and how this science is serving many industries was evidenced by the seventh private exhibition of the Radio and Electronic Component Manufacturers' Exhibition held at Grosvenor House, London, this week.

Mr. G. R. Strauss, speaking at the inaugural luncheon, said that the Ministry of Supply and the industries represented were virtually in partnership in development of the science of electronics.

Representatives from 20 countries attended the opening of the exhibition by Sir Robert Renwick. Besides valves, and test gear for the radio television, electronic and telecommunication industries, some of the components on view played an important part in nuclear research and atomic energy development.

A feature of the display was a tendency to make miniature components. Some of the valves developed for hearing-aids are so small that three will go into a thimble.

The Stock and Chemical Markets

NOW Budget uncertainties have been removed, the City is expecting some improvement in business in stock markets and a revival in new issue activity.

The expected big issue by British Electricity is likely to appear shortly and the terms of this may have an important bearing on the gilt-edged market. A big issue may also be pending from British Oxygen, whose annual report shows capital commitments of £3 million.

Chemical and kindred shares are moving within narrow limits, with Imperial Chemical slightly lower at 42s. 6d. Laporte Chemicals 5s. units are 9s. 3d., Boake Roberts 26s. 3d., Brotherton 19s. 3d., and Albright & Wilson have firmed up to 29s. in anticipation of the results. F. W. Berk 2s. 6d. shares were 14s. 3d. Triplex Glass shares rose sharply to 18s. 3d., and United Glass Bottle, at 69s. 4½d., remained firm on the financial results.

Monsanto Chemicals were firmer at 48s. 3d. on the full results and the chairman's annual statement, which emphasise the progressive policy of the company. British Glues & Chemicals 4s. shares remained more active in anticipation of good results, changing hands around 20s. 9d.

There was again uncertainty among shares of companies connected with plastics. De La Rue at 19s. 9d. failed to recover from their recent reaction, but British Xylonite have been firmer at 66s. 10½d. The 4s. units of the Distillers Co. were more active around 17s. 6d. United Molasses fluctuated at about 40s., but Dunlop Rubber eased to 61s.

British Oxygen were easier at 93s. 9d., awaiting the annual meeting for possible news of an issue of capital. Should it be made, the market expects shareholders to have preferential terms of allotment.

Iron and steel shares were generally firmer and Guest Keen strengthened to 41s. 3d. in anticipation of the financial results. Stewarts & Lloyds strengthened to 51s.

Cement shares remained under the influence of the view that prospects of higher profits for leading producers are promising. Associated Cement were 79s. 9d. and Tunnel Cement 47s.

Boots Drug remained active around 46s. 3d., the market view continuing that the dividend is likely to be maintained for the current year. Beechams deferred units were about 13s.

Borax Consolidated shares kept steady at 51s. 6d. Glaxo Laboratories changed hands actively around 47s. Despite market talk that the Dutch company may not be able to maintain its dividend, Lever & Unilever became steadier at 39s. 10½d. Lever N.V. at 40s. were virtually at the same level.

Market Reports

A STEADY demand characterises nearly all sections of the industrial chemicals market, and few quotations have revealed any important changes. Some substantial changes were, however, anticipated as a result of the substantial rise in the price of copper. The seasonal call for fertilisers and insecticides is fully sustained and a fairly substantial movement in ammonium sulphate is reported. The soda products generally are in good request and a fair replacement business has been booked. The potash chemicals continue in brisk demand. Quiet but steady trading conditions prevail in the coal tar products market, with prices unchanged at recent levels.

MANCHESTER.—Although a steady to firm undertone continues in most sections of the Manchester chemical market, there has been little actual change during the past week. The major industrial outlets for heavy chemicals in Lancashire and the West Riding of Yorkshire are steadily employed and this is reflected in the volume of deliveries and the amount of replacement buying going on. The potash, soda and ammonia compounds are in good request and current inquiry covers a wide range of other products. Many of the fertiliser materials are meeting with a brisk demand and a steady trade is passing in most of the light and heavy tar products.

GLASGOW.—Business in general in the Scottish heavy chemical market, has been extremely slow during this week, the slowing up of orders being due to a desire to await the Budget decisions.

Metal Price Changes

The price of electrolytic copper was raised last Wednesday by £9 a ton to £162 a ton, delivered to consumers' works. The Ministry of Supply buying price for rough copper in slabs of from two to three cwt. was raised by £6 to £126 a ton. Tin prices reacted sharply, closing prices of £590 10s. to £591 showing a net loss of about £5 10s. a ton.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

TURKDEAN, LTD., Northleach, manufacturers of chemicals and insecticides. (M., 22/4/50.) March 21, deb., to Martins Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. Nov. 25, 1949.

Satisfactions

P. FOICIK SON & CO., LTD., London, E., vitreous enamellers. (M.S., 22/4/50.) Satisfaction March 27, of debs. reg. Jan. 22, 1947, to the extent of £500.

H. RUSSELL (SOAPS & DISINFECTANTS), LTD., Liverpool. (MS., 22/4/50.) Satisfaction March 27, of mort. reg. Dec. 27, 1946, to the extent of £3000 (bldgs. 6A1, 6A3, 6A5 and North Air Raid Shelter with piece of land containing the same having been released from the charge).

TURKDEAN, LTD., Northleach, manufacturers of chemicals and insecticides. (M.S. 22/4/50.) Satisfaction March 25, of deb. reg. Sept. 2, 1949.

Company News

Brush Electrical Engineering Co., Ltd.

Net profit of the group for the year was £653,878. The directors recommend allocation of £500,000 to the general reserve; preference dividend £30,250; ordinary dividend (10 per cent) £88,000; balance carried forward to 1950, £54,278.

Monsanto Chemicals, Ltd.

The consolidated accounts show that the income of the Monsanto organisation last year was £963,766 (£1,014,262 in 1948). The net profit, after tax, depreciation and other provision, was £296,384. After providing for the parent company's dividends, £487,992 is to be carried forward (£445,296).

New Registrations

Britt Detergent Co., Ltd.

Private company. (480,658). Capital £1500. To acquire the business of detergent manufacturers carried on by D. S. Morgan at 16 Morden Road, Wimbledon, S.W.19 and Leighton House, Potters Bar, Middx., as the British Detergent Co. Director: D. S. Morgan. Reg. office: Eldon St. House, Eldon Street, E.C.2.

Bursley Plastic Supplies, Ltd.

Private company. (480,789). Capital £10,000. Manufacturers of dies and tools for plastic and other manufacturers; manufacturers of chemical products, etc. Directors: A. R. Horsley and L. H. Rattenbury. Reg. office: 59 New Cavendish Street, W.1.

Derustit Services, Ltd.

Private company. (480,735). Capital £100. To enter into agreements with Derustit, Ltd., Derustit (Bedford), Ltd., Derustit (Midlands), Ltd., and Metal Laundries, Ltd., and others for the acquisition of the electro-chemical process known as "Derustit," and to act as agents for them in the arrangement of contracts with any department of H.M. Government or the boards or corporations controlling any industry which has been or may in the future be nationalised. Subscribers: W. E. Harper, T. H. G. Coleman, B. G. Smith. Reg. office: Paragon Works, Angel Street, Dudley, Worcs.

Fome Detergents, Ltd.

Private company. (480,594). Capital £1000. Directors: E. R. Fielding, R. Fielding and N. Richmond. Reg. office: 215 Regent Street, W.1.

Stamgo Manufacturing Co., Ltd.

Private company. (480,822). Capital £4000. Manufacturers and refiners and distributors of oil and oil products of all kinds; graphite and graphite products; oil and graphite blenders, etc. Directors: K. Bruggemeyer and H. Stamford. Reg. office: 8 Wood Street, Kingston-on-Thames.

Change of Name

The name of RAWLINS & SONS (ULTRAMARINE), LTD., has been changed to Reckitt's (Colours), Ltd.

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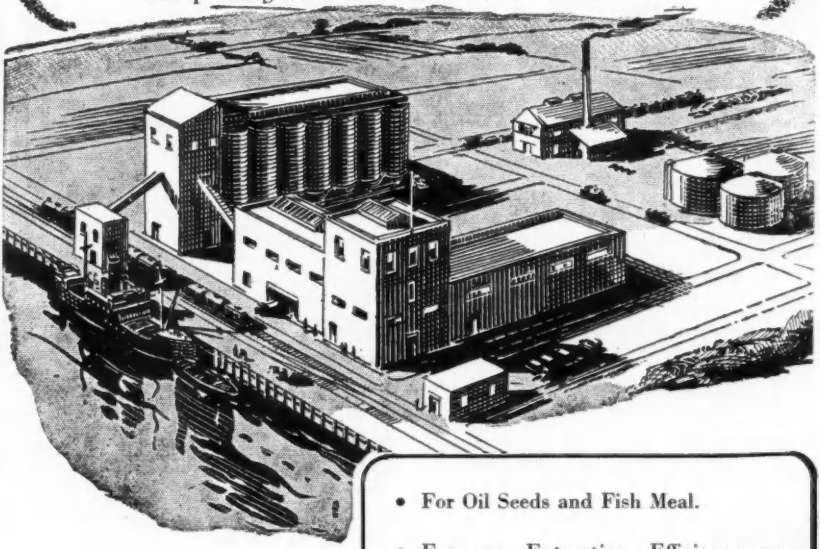

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28/4

Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2 at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Separation of dl-threonine and dl-allo-threonine.—Merck & Co., Inc. April 30 1947. 637,592.

Process for preparing a polyvinyl acetal resin and the polyvinyl acetal resin resulting from the said process.—Shawinigan Resins Corporation. May 9 1947. 637,737.

Preparation of organo silicon fluorides.—C. Shaw, W. E. Langrish-Smith, G. A. Page. May 21 1948. 637,739.

Preparation of oxidised rubber.—British Rubber Producers' Research Association, F. J. W. Popham, and J. L. Bolland. April 23 1948. 637,594.

Treatment of phosphatic substances, in particular for the manufacture of fertilisers.—Soc. Anon Des Manufactures Des Glaces et Produits Chimiques De St.-Gobain Chauny & Cirey. May 29 1947. 637,661.

Demethylation of methylbenzines.—California Research Corporation. May 29 1947. 637,595.

Process for the manufacture of aqueous dispersions of reaction products of high molecular weight from di-halogen hydrocarbons and polysulphides.—N.V. De Bataafsche Petroleum Maatschappij. July 4 1947. 637,528.

Metallo-sulpho-methyl-phenols.—Harvel Corporation. July 28 1947. 637,741.

Synthetic rubber-like compositions.—B. F. Goodrich Co. Oct. 30 1947. 637,600.

Hydration of lime.—N. V. S. Knibbs. Nov. 26 1948. 637,756.

Process for preparation of orthoformic esters.—General Aniline & Film Corporation. Dec. 5 1947. 637,757.

Continuous nitration apparatus.—Olin Industries, Inc. Dec. 9 1947. 637,561.

Bituminous paints.—H. G. Williams. April 29 1948. 637,758.

Process of preparing benzene hexachlorides. Solvay & Cie. Jan. 14 1948. 637,761.

Ferrous composition and their manufacture and application.—Hadfields, Ltd., E. W. Colbeck, and D. W. Adams. March 10 1949. 637,849.

Process for the manufacture of lead silicate.—Goodlass Wall & Lead Industries, Ltd., and N. J. Read. Feb. 8 1949. 637,622.

Case hardening of steel.—I.C.I. Ltd., and J. W. Britton. April 22 1949. 637,635.

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Regenerated protein fibres and process for preparation thereof.—Manufacturers Research Laboratories, Inc. Oct. 7 1946. 638.356.

Halogen - containing compounds. — United States Rubber Co. Oct. 30 1946. 638,414.

Purification of N-[4-[(2-amino-4-hydroxy-6-pyrimido[4, 5-b] pyrazyl methyl]-amino-benzoyl]glutamic acid.—American Cyanamid Co. Nov. 5 1946. 638,415.

Treatment of porous thermo-setting resin products.—Dunlop Rubber Co., Ltd., and M. Gordon. Nov. 11 1947. 638,416.

Polycyclic diketopyrimidines.—General Aniline & Film Corporation. Dec. 2 1946. 638,504.

Production of oxygen by liquefaction and rectification of air.—Hydrocarbon Research, Inc. Dec. 3, 1946. 638,417.

Fractionation of tall oil.—Pittsburgh Plate Glass Co. Dec. 30 1946. 638,279.

Bituminous compositions.—N.V. De Bataafsche Petroleum Maatschappij. Jan. 22 1947. 638,507.

Substituted omega-aminoacetophenones and method of preparing same.—Sterling Drug. Inc. Feb. 26 1947. 638,510.

Recovery of sensible heat from gases.—I.C.I., Ltd., and G. Nonhebel. Feb. 27 1948. 638,511.

Diazotype light-sensitive layers containing 4-bromo resorcinol.—General Aniline & Film Corporation. March 10 1947. 638,419.

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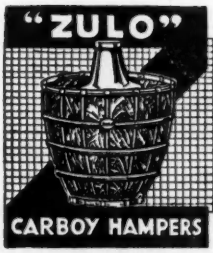

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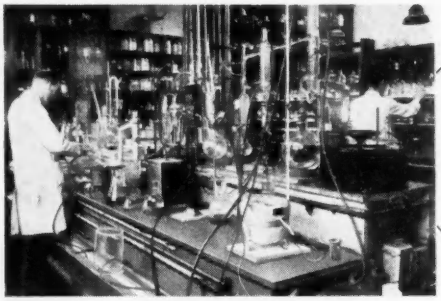

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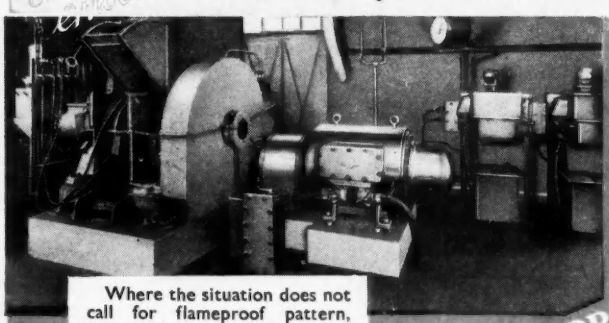

Left: A Metrovick 40 hp. flameproof motor driving Banbury mixer at a large paint works in the Midlands. The control gear is also of the Metrovick flameproof pattern.

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